

Your User Guide To **Consumer Electronics & Computers**

A Sandhills
Publication

CE TIPS



www.CEtips.com

CONSUMER ELECTRONICS **TIPS**

Wireless Networking

Plan It
Buy It
Build It

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Make Your PC A DVR

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DIY Project: Install In-Wall Speakers

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SUPER AUDIO CD

Audio Format Showdown: **SACD vs. DVD-A**

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DVD
AUDIO

WIRELESS NETWORKING

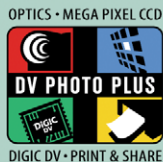
OCTOBER 2004



October 2004
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EVERYTHING YOU'VE ALWAYS WANTED EVEN THOUGH YOU'VE NEVER



Let's start with the first thing you should know. DV Photo Plus refers to the four key technologies

that give you both premium-quality video and photos from a single camcorder. And assuming that's not everything you wanted to know, here's the rest.

GENUINE CANON OPTICS

All Canon Mini DV camcorders feature high-precision lenses designed specifically for camcorder use. But did you know that each of our camcorders has a unique lens that matches its CCD for optimum quality? Or that our camcorder lenses are made with the same expertise used to create lenses

for professional photographic cameras and broadcast TV cameras? That's surely worth knowing.

Especially since your fabulous home videos will undoubtedly be broadcast to your friends and family during holidays and get-togethers.



MEGAPIXEL CCD IMAGE SENSOR

No matter what you're shooting, you'll get crisp images with life-like detail because of this Megapixel CCD. First it captures the image. Then it registers it. And then

the image processor converts the pixels into both great video and great photos. Now, on to the brains of the operation.

DIGIC DV IMAGE PROCESSOR

DIGIC DV is your camcorder's digital brain; you'll find one in every Canon Mini DV camcorder. This exclusive image processor captures accurate color for both video and digital photos. And like the human brain, DIGIC DV will help





TO KNOW ABOUT DV PHOTO PLUS. HEARD OF DV PHOTO PLUS.



you take better pictures by heightening the emotion in everything you shoot. (Colors become more vibrant, light more dramatic, and the color spectrum wider.) And, since video and digital photos have different color requirements, DIGIC DV uses two different color techniques to maximize video quality on a TV and optimize photo quality on a computer screen. You didn't know that now, did you?

PRINT AND SHARE

Print and Share makes it easy to print photos directly to a printer or to transfer images onto your computer. Simply connect the camcorder to any Canon printer or PictBridge compatible printer, select an image and voilà: you can print it for your family and friends. It's almost like having your own private photo lab.



SO THERE YOU HAVE IT

Everything you've always wanted to know about DV Photo Plus. Not just video and photos, the best of both.

Canon KNOW HOW®



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Mini **DV**



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Open

GET CAUGHT UP on the latest consumer electronics news and views and check out some great new hardware along the way. If you're a recent lottery winner or are planning on raiding the kids' college fund to buy a new TV, be sure and take a gander at "Extreme CE," where we show off electronics products we'd buy if money were no object.

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A/V Club

ONE OF THE TOUGHEST THINGS about planning a home theater is deciding where to put all those speakers. One option you might not have considered is concealing them in the walls of your favorite TV room; we'll show you how inside. Also, get some tips on ways you can keep that VCR rolling despite its advanced age and find out which of the newest audio optical media standards is better: Super Audio CD or DVD-Audio.

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Home Networking

IN THE OLD DAYS, multiplayer gaming and sharing a printer were the only compelling reasons to network multiple computers at home. Now having a home network means there's plenty of Internet to go around, as well as the ability to send digital media (music, video, photos, etc.) anywhere in the house you want it. Best of all, now you can have all of this and more without stringing unsightly network cable from room to room or fighting to string it through your walls.

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& Videophones Throughout
Your House

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Devices To Help You On Your
Wireless Way

Digital Studio

IF YOU'VE EVER UNPACKED A NEW DIGITAL CAMCORDER, you know that these handy little gadgets are adorned with nearly as many buttons, knobs, and switches as the cockpit of a 747. That's why we offer some advice on getting your new camcorder up and running with a minimum of angst, and we even threw in some expert info on how to use that camcorder to create a detailed inventory of your stuff for insurance purposes.

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Get Rolling With Your
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Video Inventoring For Insurance

CE @Home

TAKE A LOOK AT THE LATEST PORTABLE VIDEO PLAYERS (think iPods for watching movies), see how you can use your PC to

record your favorite TV shows a la TiVo, and find out how inexpensive car computer diagnostic tools can save you a bundle. We'll also peek in on artificial intelligence and see how it's coming along, as well as where and how it got started.

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Reviews

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Press Play

CHECK OUT what happens when avant-garde design meets the everyday, functional computer mouse in this month's installment of "CE Lite"; take in our reviews of the latest music, movies, and video games; and bear witness to the long, impressive history of portable music players.

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On The Lighter Side
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The Latest Tracks & Flicks:
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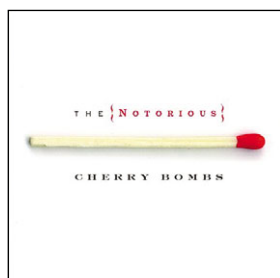
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Portable Video Done Right



Editor's Note

Multi-PC homes aren't quite as common yet as homes with two or more TVs, but it seems likely that we're headed in that direction.

Maybe you need both a desktop and a notebook at home, or maybe you bought a new PC at some point and just couldn't bear to part with the old one. Or maybe your kids needed a PC for school and you elected to buy them one rather than have your Desktop wallpapered with shots of Britney Spears or Harry Potter.

In any event, if you have two or more computers in the house and you want to share high-speed Internet access among them, wireless networking represents the most convenient way to go about doing so. And sharing a fast Internet connection is just the beginning; a wireless network also makes it easy to send your favorite music, movies, and pictures anywhere in your house you can put a device to receive and use them. In this month's feature section, we'll tell you what you need to know about Wi-Fi and related technologies to get started, how to build a network, and fun things you can do with it once it's up and running.

If wireless networking isn't your thing (or in case your house has been a hotspot for years), we also put together a great piece on installing in-wall speakers, another one on using your PC to record TV shows, and still another using a camcorder to make a video inventory for the folks at your insurance company, just in case.

Also in this issue, get tips on troubleshooting VCRs, check out 16 pages of CE hardware and software reviews, read a comparison of the fledgling Super Audio CD and DVD-Audio formats, and the list goes on. In short, if you're interested in consumer electronics, you're holding the right magazine.

Thanks for reading, and we'll see you next month.

Chris Trumble, Publication Editor, *CE Tips*



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180°

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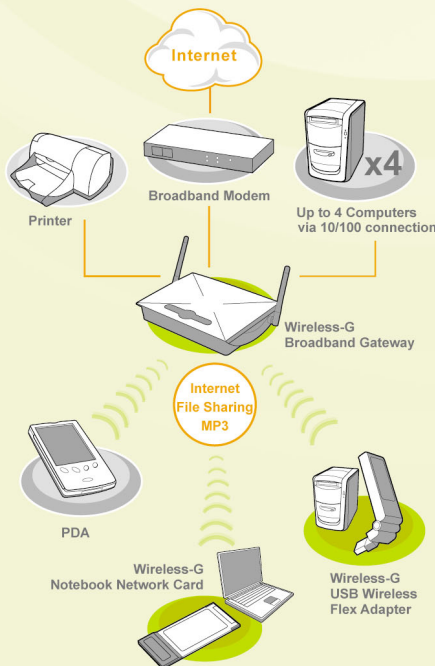
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GWU513

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2 IN 1
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&
Print Server!



GWA501

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- Fast setup in just a few simple steps
- Includes everything for effortless installation
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- Built-in print server shares your printer with all connected computers

GWP511

Wireless-G Notebook Network Card

- Low-profile high-gain antenna achieves favorable sleek design
- Included Software Access Point allows you to turn your notebook into a wireless Access Point



Retire the Wire.



10

Tips On . . . Video Game Consoles

Plug 'em in and sit down and play, right? True, or at least mostly true. You can fine-tune your video game system in several ways, however, and you can take steps when the thing lets you down.

1

Practice Safe Joysticking

Manufacturers do their level best to make their controllers work for every pair of hands, but many people find one controller or another uncomfortable. Sometimes, they even cause pain. Playing these games is

all about repeating actions on your controller, so the likelihood of developing discomfort caused by repetitive stress is high. For some hands, the standard PS2 controller is too small and causes wrist cramping; for others, the larger Xbox controller demands that fingers stretch too far. Although we can't recommend any of the third-party controllers out there, try alternative controls, such as a keyboard (available for some games), or rearrange which button controls which action. You can train yourself to use the controller in a manner that no longer causes discomfort. For example, you don't have to squeeze the thing until it comes close to breaking. The best advice of all is also the most practical: Take a break every so often.

2

Change Wires For Higher Resolution

You might think the graphics on your console are great when you fire up your machine and play your first game, but you can make them better by connecting them to the higher resolution ports on your TV. All three major consoles connect, by default, to your TV's RCA input jacks. You'll get a significantly better picture if you connect to the S-Video jack and an even better one if you use the component video inputs. To make this happen, though, you'll need two things: a TV that has these input capabilities (most new sets have at least one) and an adapter for your console that gives you the wires necessary to connect. You can buy an adapter from the console manufacturer's Web site or





at your local electronics store. Visit www.xbox.com, www.us.playstation.com, or www.nintendo.com for information.

3

Split Up Your Signals

Component video gives you the highest quality for your games, but most TVs have few component video inputs. You can buy a video receiver with multiple component inputs. But if you're on a tight budget, buy a component splitter, such as Cable Electronics Component Amplifier (\$94; www.cable-electronics.com/Amp400COMP.html) and Pelican System PL-957 Pro System Selector (\$99.99; www.pelicanperformance.com), that accomplishes the same thing. You can always resort to the manual method, disconnecting one device and connecting the next, but that's far from convenient, especially if you also have a DVD player that wants to use the TV's component inputs.

4

Get Past The Learning Curve

Some games are easy to play out of the box. Others, not so much, but don't give up if you don't get the game right away. Fire up the game and take an evening to learn the games' various elements (characters, equipment, brakes and gear shifts, power-ups, construction systems, etc.). After that, do what most of us desperately try to avoid—read or at least skim the instruction booklet—to see what you missed and how you can improve your play. Designers of video games put a wealth of play into their games, often far beyond what many players will ever see, and it's easy to get overwhelmed the first time out. This is especially true when you typically play one genre of games (shooters, let's say) and you switch to a different genre entirely (sports, strategy, role-playing, etc.).

5

Go Ahead, Cheat

Getting past the learning curve isn't the only difficulty in some games. Nothing's more frustrating than opening a new game, getting five minutes into it, and having no idea

what to do next, even though you've mastered the interface. In role-playing games, it happens while trying to get past the first few rooms; in world-building games, when you can't figure out what's to do after building a granary or temple. Give yourself a break and search for hints and walkthroughs. Hints are best; you still have to use your brain. If you're having trouble, use the first part of a walkthrough to see how the game plays. For true cheating, look online for cheat codes (Web, newsgroups, game magazine sites) and see how many features you can change. Most games have a lot of options in their code that aren't on the main menu.

6

Center Your GameCube On The Screen

If you start your GameCube and the image isn't centered, you don't have to wish you knew what was happening off to the side. Hold down the A button on the controller as you power up the console to access the GameCube menu. Choose the Screen Position option and, using your controller, move the image in the direction needed to align it with the sides of the TV.

7

Go Wireless

If you play games online but you don't want a big, fat Ethernet cable snaking into your family room, make your network wireless. You'll need a wireless access point and/or a router to provide Internet connections to your PCs, and you'll need an 802.11b or 802.11g wireless adapter for your Xbox or PS2. Buy these adapters from companies such as Linksys or D-Link. Establish the Internet connection on the adapter (the instructions in the box tell you how) and plug the adapter into the game console. Power up the console, enter the network configuration screens, and enter your username and password to access the gaming network.

8

Get PS2's DVD To Work Properly

Locked yourself out of your PS2's DVD system with the parental

control feature? Can't remember the password? No sweat; call up the password screen and type **7444**. This password deletes the existing password and opens the system (secure, huh?). And what if your DVD plays in black and white instead of color? Well, make sure you're not running the PS2 into a VCR and then to the TV; if so, you might be a victim of copy protection. Plugging it directly into the TV should solve the problem. Lose your PS2 DVD remote? Again, no sweat; use the game controller, pressing Start for Play or Stop, the triangle for Pause, and the R and L buttons to fast-forward, rewind, and skip chapters.


9

Work Around PS2's Infamous Disc Read Error

PS2 can't read some CDs or DVDs. The system displays a Disc Read error message, and the game won't start. First, call Sony and see what it recommends, especially if the console is under warranty. Next, clean the disc and the system; you can clean the system with a small vacuum, opening the CD tray and gently applying the smallest hose you can find. Next, affix a small length of tape to the bottom of the CD, equidistant from the hole, in an attempt to raise the CD away from the laser. Incidentally, all these tips can work with Xbox read errors, as well.

10

Should I Boil My Xbox CDs?

We've seen the suggestion that you can make an unreadable Xbox CD readable by immersing it in 1 or 2 inches of boiling water for 15 to 20 seconds. Does this work? Our experiments have shown no improvement at all (which could mean the CDs have other problems). So, we recommend that you proceed at your own risk. Before doing any of this, however, try a product such as Digital Innovations' Game Doctor Video Game Disc Repair Kit (\$24.88; www.jr.com/JRProductPage.process?Product=3731193). 

BY NEIL RANDALL

CE News

COMPILED BY TRACY BAKER

RAZR Thin

Cell phones continue to slim down, but Motorola's upcoming RAZR V3 is a hardcore carb counter. The phone measures less than 1/2-inch thick when closed, even though it incorporates a camera; it has a 2.2-inch color display on the inside of the unit, and a smaller color display on the outside. The antenna is completely internal, giving the device an even sleeker look, and it eschews thick keys in favor of a chemically etched keypad that is paper-thin and backlit in blue. The only drawback is that the device lacks slots for external storage devices, so users will have a hard time fitting a lot of music, movies, and pictures

within its integrated storage space, but with looks this good, gadget nuts likely won't care.



Video On The Go With Portable Media Centers

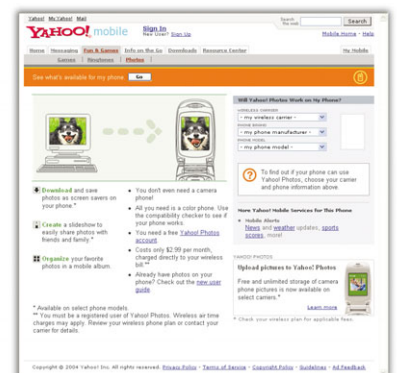
Hate to break it to you, but that fancy new portable digital music player you just dropped a bundle on is already slouching toward obsolescence because Portable Media Center products are just around the corner. These highly anticipated products store files and play digital music like any other portable playback device, but they also have color displays for video playback and a special version of Microsoft's Windows Mobile OS that is optimized for multimedia. Amazon.com started taking preorders for Samsung's Yepp YH-999 and Creative Labs' Zen Portable Media Center in July 2004, and both products are slated to ship in late summer or early fall.



Unlimited Storage For Camera Phone Users

Camera phones are swiftly hitting the mainstream and for good reason. Quality is slowly improving, prices keep falling, and the convenience of always having a camera within easy reach is simply too good to pass up. Camera phones tend to have limited amounts of storage space, but Yahoo!'s new Mobile Photos Upload service (mobile.yahoo.com/photos) is designed to alleviate that problem. After signing up for a free Yahoo! Photos account, users can pay \$2.99 per month to upload an unlimited number of pictures to virtual photo albums stored on Yahoo!'s Web servers. Users without camera phones can use the service to download pictures from their albums (that were uploaded via a PC) to use as screen savers on their color phones.

The service is currently available to AT&T Wireless, Cingular, Nextel, Sprint, T-Mobile, and Verizon customers in a variety of locations throughout the United States. Check the previously mentioned Yahoo! Web site to see if your phone supports the service.





Sharing Tomorrow's Movies

Talk about mixed messages. While DVDs are locked down using Macrovision and other DRM (digital rights management) tools, and companies are sued for providing software that makes it easy to copy DVDs, suddenly a group appears that says it's OK to copy prerecorded movies—as long as we agree to play by its rules.

The technology is called AACS (Advanced Access Content System) and currently is backed by AACS License Authority founders IBM, Intel, Microsoft, Panasonic, Sony, Toshiba, Walt Disney, and Warner Bros. It is designed to protect upcoming HD prerecorded content while simultaneously letting us make copies of videos for personal use or for limited sharing. The idea is that when you buy a next-generation prerecorded movie, you'll be able to enjoy it on multiple devices throughout your home or on the go (even across a wireless network connection) without having to buy additional copies. The DRM technology, however, will prevent you from making tons of copies for friends or distributing the flick to others via the Internet.

So how does it work? You'll register playback devices in a database. Each time you play an AACS-protected disc, a crosscheck is done against the database. This means all playback devices used to watch AACS-protected movies must have an Internet (or potentially phone) connection to perform the database check, and it currently means that AACS protection will only be used on optical discs, not downloaded content. It remains to be seen if other major players from the various industries already represented in the AACS License Authority will help give the technology enough inertia to break into the mainstream.



iTunes Draws A Crowd

This summer, Apple's iTunes music download service surpassed 100 million downloaded songs, and those numbers along with Apple's wildly successful and iTunes-compatible iPod line of digital music players are drawing a lot of attention from other companies. Motorola recently inked a deal with Apple to incorporate a special version of iTunes into future wireless phones that will let users download songs from the service directly to their phones via a USB or Bluetooth connection. The companies expect phones with these capabilities will appear by early 2005.

In other iTunes-related news, RealNetworks (www.real.com), maker of the RealPlayer series of multimedia playback software, recently announced its Harmony technology that serves as a DRM (digital rights management) translator and lets users download protected songs from services, including iTunes, and play them back on nearly any portable digital music player. Lawsuits are expected from Apple, as content from iTunes is designed to work only with iPods but can now be transferred to competing digital audio players via Harmony, which also transfers songs from competing download services to iPods.

3G UMTS Phones Hit The Streets

A privileged few Americans can now get a taste of the data capabilities 3G (third generation) cellular phones have delivered to Europe and Asia for more than a year. AT&T recently rolled out 3G UMTS (Universal Mobile Telecommunications System) technology in Detroit, Phoenix, San Francisco, and Seattle, with plans to also make the service available in Dallas and San Diego by the end of 2004.

The main draw of 3G UMTS is its high data transfer rates relative to 2G cellular phones. AT&T's current, 2G wireless service, called EDGE (Enhanced Data for GSM Evolution), features data transfer rates of 100Kbps (kilobits per second) to 130Kbps, which is up to three times faster than speeds provided by

the dial-up modems many home computer owners use to connect to the Internet. The 3G UMTS allows for average speeds of 220Kbps to 320Kbps, with burst rates as high as 384Kbps. AT&T claims that in the future, its 3G UMTS service can be upgraded with HSDPA (High Speed Downlink Packet Access) technology to boost wireless data transfer speeds to a whopping 14.4Mbps (megabits per second), which is more than twice as fast as the fastest broadband Internet services consumers have access to today.

Currently, AT&T customers in the markets served by the 3G UMTS technology can access it using the Motorola A845 or Nokia 6651 handsets. Data rates step down to lower levels when users are

outside of the 3G UMTS coverage area, but AT&T says that users can access voice services in more than 140 countries and data services in more than 60 countries.





Open

Consumer Electronics Marketplace

CE Prices Continue To Tumble

The NPD Group tracks average consumer electronics prices in more than two dozen categories, and its most recent data indicates that average prices for a "market basket" of CE products has fallen by more than \$4,100 or 25% since January 2003. Plasma screens account for a large chunk of that total, with prices falling by more than \$1,000 since the beginning of last year. In just one month, March 2004 to April 2004, DVD recorder prices fell by nearly 10% and personal CD player prices dropped by more than 7%. The following is a breakdown of the camcorder, digital still camera, and television markets a month after the report was compiled.

Camcorders



Channels: Electronic/Appliance Stores, A/V Specialty, Mass Merchant, Other. Total May 2004 Dollar Volume: \$119,070,700

Source: The NPD Group/NPD Techworld®

Brand May '04 Unit Share

1. SONY	44.1%
2. PANASONIC	16.3%
3. CANON	12.8%
4. SAMSUNG	12.4%
5. JVC	11.8%

Digital Still Cameras



Channels: Photo Specialty, Electronic/Appliance Stores, Computer/Office Superstores, Mass Merchant, Mail Order. Total May 2004 Dollar Volume: \$264,641,200

Source: The NPD Group/NPD Techworld®

1. KODAK	19.2%
2. CANON	18.4%
3. SONY	18.0%
4. OLYMPUS	12.8%
5. FUJIFILM	9.7%

Television



Channels: Electronic/Appliance Stores, A/V Specialty, Mass Merchant, Other. Total May 2004 Dollar Volume: \$650,325,100

Source: The NPD Group/NPD Techworld®

1. SONY	14.7%
2. TOSHIBA	12.0%
2. PANASONIC	9.6%
4. RCA	8.5%
5. SHARP	7.4%

Pirates Continue To Loot



A recent IFPI (International Federation for the Phonographic Industry) study indicates that music pirating is a growing problem with serious financial repercussions. Here are some highlights:

Global sales of illegal music rose **4%** in 2003.

Music pirates sold more than **1.1 billion** illegally copied CDs in 2003, which amounts to \$4.5 billion in lost potential revenue for the music industry.

Roughly **35%** of all CDs sold today are pirated, compared to roughly 20% in 2000.

Brazil, China, Mexico, Pakistan, Paraguay, Russia, Spain, Taiwan, Thailand, and Ukraine are flagged by the IFPI as "priority countries," where piracy is most rampant.

Tidbits

Microsoft's Xbox Live online gaming service recently broke through the 1-million subscriber mark. Members play a combined average total of **265,549 hours** per day, totaling more than 20,000 years of combined playing time since the service debuted in 2002.

Source: Microsoft

The T2500 TiVo unit from Humax stores up to **300 hours** of video.

Source: Humax

Starbucks now offers Wi-Fi access in more than **3,100** of its locations.

Source: Starbucks

Sony's new Micro Vault Pro USB micro drive stores up to **2GB** of data.

Source: Sony

Satellite radio provider Sirius now reaches more than **500,000** subscribers and hopes to have 1 million subscribers by the end of 2004. Competitor XM Radio announced that it now has more than **2.1 million** subscribers.

Source: Sirius and XM Radio

Memorex now sells recordable DVD+Rs that record at record **16X** speeds.

Source: Memorex

Clear Channel Communications plans to broadcast HD Radio transmissions on more than **1,000** of its stations as the technology rolls out over the next two to four years.

Source: Clear Channel

IT'S SHOWTIME



Talk about box office hits. Verbatim's new DigitalMovie™ DVD recordable media is so hot you can almost smell the popcorn. Available as DVD-R or DVD+R, this 4X speed DVD media looks – even feels – like a Hollywood movie reel. But don't think you need a director's chair to use them. These mini-reels are perfect for home movies, business presentations, transferring files – anytime you want to add a little fun to the show. And of course, DigitalMovie DVD has the same unsurpassed performance and reliability you've come to expect from Verbatim. So make your next show a feature presentation. DigitalMovie DVD from Verbatim. It's the reel thing. For more information, contact us at 800-421-4188 or online at www.verbatim.com.

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A Look At The Latest Consumer Electronics

We love our jobs. Sometimes, all the new releases come together to form a collection of stuff we'd love to get our hands on. Here's a sampling of the newest products we can't wait to test.

By Gregory Anderson

Archos AV400

\$549.95

www.archos.com

The PMP (Personal Media Player) wars are just getting underway. And Archos is already ahead of the game, on its second generation of devices. The 20GB AV400 doesn't stop with 80 hours of TV-quality or 40 hours of DVD-quality video. And it goes beyond standard support for audio and image files, including support for MP3, WMA (Windows Media Audio), WMV (Windows Media Video), and JPEG (Joint Photographic Experts Group). It also has an FM radio and recorder, a CF (Compact Flash) reader, and a TV Cradle for easy recording and scheduling of TV, DVD, or VHS material. Let the games begin.



Apex MP-2000

\$399

www.apexdigitalinc.com

Apex is staking its claim to the emerging PMP market with a model that offers 20GB of storage, direct audio and video recording from a variety of sources, and a 3.5-inch LCD. And it weighs just half a pound. That 20GB gets you 40 hours of MPEG-4 (Moving Picture Experts Group, 4) video, albeit with just a four-hour (video viewing) battery life. If you've been dying for video on the go, your world is about to get a lot richer.





Open



Canon CanoScan LiDE 35

\$79.99

www.usa.canon.com

When you're ready to start archiving all those old photos and historic documents, the CanoScan will be there to help. The entry-level model in Canon's line of slim LED (light-emitting diode)-based scanners, the LiDe 35 offers fast USB 2.0 transfer and an option for scanning directly to PDF. The USB connector also provides the unit's power, helping to eliminate cable clutter. The 1,200 x 2,400 optical resolution will handle all your prints, and the image-correcting tools will help clean up those battered memories.

Garmin eTrex Vista C

\$428.56

www.garmin.com

If you're ready to get on the GPS (global positioning system) bandwagon, the new eTrex Vista C isn't a bad way to start. The svelte device (just 4.2 inches high x 2.2 inches wide x 1.2 inches deep) has a full-color screen, 20 hours of battery life, and a 24MB internal memory. It stores regular, marine, and topographic maps and generates routes automatically. With its electronic compass and barometric altimeter, you'll always know exactly where you stand.



Concord Eye-Q 3343z

\$199.99

www.concord-camera.com

If you're looking for a low-priced digital camera with just enough features to make it worth owning, look no further. Concord's Eye-Q 3343z is a 3MP (megapixel) model (good for 5- x 7-inch prints) with a 3X optical zoom, glass lens, and basic manual controls. The SD (Secure Digital)-card slot makes for nearly unlimited storage and the "assist light" helps the sensor focus in low-light conditions.



JBL On Tour

\$99.95

www.jbl.com

If you're listening to a song on your iPod and you want everyone in the room to hear it, plug in JBL's On Tour speaker unit. The On Tour actually connects to any digital music player (or any other device with a mini headphone jack) and runs on four AAA batteries or an included AC adapter. The 6 watts (peak power) of speaker output from the dual transducers won't rattle the windows but will probably outperform your cheap stock PC speakers.



Kenwood NHT-S810DV

\$1,150

www.kenwoodusa.com

Why bother with a separate media player when you can get everything in one box? The Kenwood NHT-S810DV system is a seven-speaker, 6.1-channel, DVD home theater in a box, with a twist. The AV receiver also includes an Ethernet port for streaming video, audio, and images from a home PC network. And dual-source audio means that someone can play games with his headphones on while you listen peacefully to music.

LG DU-30LZ30

\$3,699.95

www.lge.com

LG's year-long march into the U.S. electronics market continues with its latest LCD TV offering. This 30-inch widescreen model won't dominate your room, but it will definitely impress when the lights go out. It includes an integrated HD tuner, HD component and DVI+HDCP (digital video interface-high definition copy protection) inputs, and a 176-degree viewing angle. But our favorite feature is what's removable: You can ditch the included speakers in favor of your (better) home theater models.





Open



Motorola V710

\$319

www.motorola.com

How do you combine business with pleasure? Motorola's V710 does it by adding Bluetooth to its first megapixel camera phone for CDMA (Code Division Multiple Access; provided by Verizon and U.S. Cellular) networks. The high-quality speakerphone and PC syncing will keep you grounded in the office, while the 1.2MP still and video captures plus integrated MP3 player let your mind roam free.



Panasonic PV-GS400

\$1,499.95

www.panasonic.com

Talk about image quality. Panasonic's newest camcorder combines a three-CCD (charge-coupled device) video system with a 4MP still camera. Three CCD sensors (one each for red, green, and blue) create better color and improve low-light performance, while Panasonic's optical image stabilization makes for smoother footage. The 12X optical zoom and full set of manual controls are almost just icing on the cake.

SanDisk 256MB + Wi-Fi Combination Card

\$129

www.sandisk.com

Don't worry if your Pocket PC is a little under-featured. You're not out of luck yet. SanDisk's new combination SD card does more than just give you an extra 256MB of storage. It's also an 802.11b wireless network adapter. Just plug it into any Pocket PC 2002, Pocket PC 2003, or Windows Mobile device and log on. The device supports WEP (Wired Equivalent Privacy) and WPA (Wi-Fi Protected Access) encryption standards, helping keep your data secure. Now there's no excuse for not checking your email from the airport.





Shuffle

Wireless, Wi-Fi & Your Actual Mileage

COMMENTARY BY BERNARD YEE

My recent brush with a hacker trying to get on my laptop while connected to an open Wi-Fi hotspot revealed something that the Wi-Fi bandwagon doesn't talk about. Hotspots are touted as a way to get convenient broadband access in public; Starbucks charges for its T-Mobile Wi-Fi access, but many more places are offering free access. New York City's Bryant Park is a huge, free Wi-Fi hotspot. Check your email, surf the Web, buy some stuff on Amazon.com. Even as vendors remind us to enable Wi-Fi security at home, no one's saying anything about the open networks; they're open because they use no security safeguards.

You shouldn't be doing anything on a public network that's sensitive, such as online banking or Amazon.com transactions. I'd think twice about even checking my email with an unencrypted email password. In the wrong hands, programs such as Ethereal (www.ethereal.com) and NetStumbler (www.netstumbler.com) can make quick work of that data sent over unencrypted Wi-Fi.

Wireless Junkie

But once you've tasted wireless access, it's not easy to give up. There's an alternative to unsecured Wi-Fi networks: data access via the cellular carriers. Cell carriers declare this wireless network more secure than public Wi-Fi hotspots, but right now, it's much slower. And it's not free.

The easy way to do this is to buy a PC card and slide it into your laptop, and you're wireless from an Amtrak train, in an LAX passenger terminal, or anywhere else you can get a cell signal. AT&T's EDGE network, available in New York City, gave me 141Kbps (kilobits per



Make sure you have security measures in place and then connect the Fujitsu LifeBook E8000 via 802.11g/b to a Wi-Fi network.

second) down/36Kbps up from a strong signal, though I had problems connecting from areas where the signal was more marginal, and when I did get through, 44Kbps/33Kbps (probably falling back to the GPRS [General Packet Radio Service] network) is all I could muster. Sprint's PCS Connection card uses a slower technology, which I found more accessible than AT&T's network. My throughput rate from a location with two bars of signal was 40Kbps down/62Kbps up, and at four bars, a healthy 71Kbps/66Kbps. (Disclaimer: Your mileage will vary.)

My big project was to connect my Sony CLIE UX-50 PDA, possibly one of the finest gadgets ever, via Sony Ericsson T616's Bluetooth to a Cingular GPRS data network. Getting the UX-50 and the T616 to actually talk to each other was a Herculean task; Cingular tech support was useless, and the CLIE's software used Cingular login settings that were several years out of date, so I had to hit several threads on the.one.source (www.1src.com) to see what other users had done. In the end, I had to change initialization strings and network settings on my phone and pray.


But it worked. I was able to check my email on-the-fly like a Blackberry user. Go to ESPN.com on the bus. If you're serious about using your UX-50, I recommend the extended battery (hard to find now that the UX-50 is discontinued), Versamail (you can download only mail subjects, which is good for saving time and bandwidth), Verichat (a Trillian-like multiple IM PalmOS client), and track down information on how to install NetFront 3.1.

Cingular's GPRS is slow (10Kbps to 36Kbps, and my plan was metered), 1MB per month for \$7.95. For both reasons, I only download the message subjects; if the network were faster, I'd gladly pay the \$20/month for unlimited data access.

Laptop users can use the phone, too; the best deal today is Sprint PCS with the \$15/month Vision plan and a cable you can buy from RadioShack (check howardforums.com and SprintUsers.com for details). Sprint prohibits using your phone to dial in and access data from its data network, and further, data access drains the battery dry, quickly.

AT&T and Cingular are rolling out UMTS (Universal Mobile Telecommunications System), which promises 220Kbps to 320Kbps down/64Kbps upload speeds, while Verizon and Sprint are deploying EVDO (Evolution Data Only) networks, which average 300 to 500Kbps/153Kbps, with a theoretical maximum of 2.4Mbps (megabits per second) down! LG has already shown its first EVDO phone, the VX8000, which you can connect to your PC's USB port, though LG's omission of Bluetooth is disappointing. The forthcoming EVDO standard promises a maximum upload speed of 1.8Mbps—perfect for video calling.

I sit here, waiting for UMTS to be rolled out in New York City and dreading the configuration nightmare of getting my UX-50 to talk to a UMTS Bluetooth phone. I must be a masochist. But let me humbly request that every UMTS or EVDO phone support Bluetooth and each cell carrier's tech support get trained on how to interface these devices with PCs and PDAs.

Now pardon me while I check my email. 

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Extreme CE

When Money Is No Object

Welcome back to the column where drooling is not only acceptable, it's expected. These products certainly have *us* salivating.

COMPILED BY SEAN DOOLITTLE

Samsung HPP5091 50" Wireless HD Plasma Television

\$12,999 • www.samsungusa.com

When we imagine a big, beautiful plasma TV hanging on the wall like a living work of art, most of us forget to imagine that unsightly bunch of cables trailing all the way back to the required external media box. Reality can be so ugly. Enter Samsung's new plasma widescreen. The 50-inch monitor is fed by a wireless media box with built-in NTSC/ATSC (National Television Standards Committee/Advanced Television Systems Committee) tuners, all the inputs you need, Samsung's lauded DNIe (Digital Natural Image engine), and an effective range of 30 feet. Imagine it.



JVC EX-A1 Desktop Music System With Wood Cone Speakers

\$550 • www.jvc.com

Speaker makers know that solid wood does beautiful things with frequency response. But how do you make a woofer out of wood? Soak it in booze first! According to company lore, a JVC audio engineer in Japan asked a restaurant

how they made their dried squid so chewy. The chef's secret: Soak the meat in *sake* (Japanese rice wine). JVC's engineers applied the same recipe to sheets of birch and found the sake made the wood flexible enough to mold into speaker cones. Thus, we have the very handsome EX-A1 compact audio system. We hear it goes great with a spicy salmon roll. . . .





Silicon Optix Image AnyPlace Video Scaler

\$2,495 (additional \$1,495 for eWARP software)

• www.siliconoptix.com

Who doesn't have room for a home theater? With the help of the Image AnyPlace video scaler, you can put that fancy new DLP (Digital Light Processing) projector, well, just about any place in a room. This compact signal-processing unit throws a perfect HD image from a range of extreme angles, turning any room into a screening room without rearranging the furniture. The optional eWARP software allows accurate projection onto curved or domed surfaces, too. Popcorn machine not included.



Beyond iCEBOX FlipScreen 04 Kitchen Entertainment Unit

\$2,299

• www.beyondconnectedhome.com

You've heard the statistic that says people spend most of their time in the kitchen. With Beyond's iCEBOX FlipScreen 04, why leave at all? You've got your TV, your radio, your DVD/CD player, your video monitor, and your Internet access all within reach of the cutting board. Even the keyboard is washable.

AKG Acoustics Hearo 999 Audiosphere II Wireless Surround-Sound Headphones

\$1,290 • www.akg.com

Question: What do you get when you combine analog and Dolby Digital inputs, 24-bit signal processing, digital transmission up to 150 feet, and seven physical curvatures based on the shape and function of the human ear?

Answer: Cutting-edge surround sound in a pair of stereo headphones—with no wires.



A/V Project

How To Install In-Wall Speakers



In-wall speakers have been around for a long time and are usually found in the ceilings and walls of public buildings. You can even find a version tucked away in the door paneling of your car. They are unobtrusive, they have no exposed wires, and there are no cabinets to scratch. For all these reasons, these units are preferable for those who are design-conscious, one of the lesser known, but more important considerations you can make when shopping for speakers. When faced with the problem of how to set up five or seven speakers for a home theater system in a room without demolishing the décor, it's no wonder many people are turning toward the in-wall option.

From the point of view of sound quality, these speakers take advantage of the concept of the infinite baffle.

Because the drivers are mounted flush with a large flat surface (the wall), the speaker behaves as if there were no back wave created by the recoil of the speaker driver. The wall absorbs the back wave and is not heard. This has important theoretical benefits for sound quality. Though the very best speakers are still to be found among the freestanding types, in-wall speakers have made major strides in sound quality.

The biggest drawback to the in-wall speaker is the installation process. Most people don't look

forward to the task of mounting five speakers in a room, let alone cutting holes in the wall. But don't despair. Any homeowner can install in-wall speakers with a little patience and some helpful advice. The costs are minimal, and the aesthetic result is worth the effort. If you don't see yourself going through the process outlined below, you can always rely on a professional installer to do the job.

Anatomy Of An In-Wall Speaker

The in-wall speaker consists of a housing that goes inside the wall, a system of special clamps that attach the housing firmly to the drywall or paneling, and a grille that covers the hole. The housing contains the speaker drivers and the crossover electronics. Typical driver arrangements are **coaxial**, in which a small tweeter is mounted in the center of a larger woofer; and the **side-by-side** arrangement, in which the tweeter goes next to the woofer. There are also **three-way** speakers with a tweeter, a midrange, and a woofer. Coaxial speakers typically have a round grille, whereas the side-by-side units have a square grille. In-wall speakers are usually less than 10 inches wide, so they can fit between the wall or ceiling studs, which are 16 or 18 inches apart.

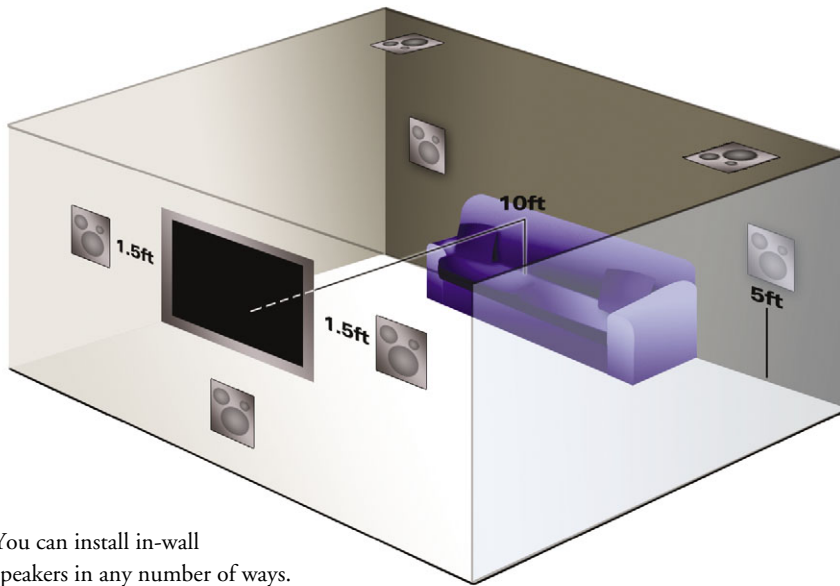


A square in-wall speaker blends into your surroundings. You can even paint the bezel to match your wall.

What You Will Need

To complete the installation, you will need a ladder (for ceiling installations); a drill; a utility knife or saws—all for cutting a hole; a coat-hanger or other long, semiflexible rod for running the wires in the wall; a screwdriver (usually with a Phillips or star-shaped bit); and a stud finder (no jokes, please). The **stud finder** is a battery-operated

device that uses sound waves to locate the studs behind the drywall. You can



You can install in-wall speakers in any number of ways. Here is one example, with a pair of speakers installed in the ceiling and another along the back wall.

buy one for around \$20. Alternatively, you can use the “knocking method” to listen for a change of sound when you knock on a stud. (This can be very unreliable.) Another low-tech method is to mark where you think the studs are based on the knocking method and then test your accuracy by hammering thin nails through the drywall. If the nails “fall” through into empty space, there’s no stud.

Where Do The Wires Go?

The most difficult part of in-wall installation is running the wires. To get the full aesthetic benefits of in-wall installation, the wires are run through the walls or ceiling so they remain out of sight. From your amplifier, the wires enter the wall, and then either go up to the attic, or down into the basement. From there, they travel to the wall that holds the speaker. In general, this is easier to do with inside walls rather than exterior walls because exterior walls are heavily insulated and may contain fire stops and vapor barriers. An unfinished basement will be easier to work with than an unfinished attic, as attics with no floorboards mean you have to crawl

around on roof trusses in a dark, dusty environment. If both the attic above and basement below are finished, you can remove the wall’s baseboards, run the wires behind them, and then replace the baseboards. Finally, there are special flat wires that you can apply directly to walls in plain view. Once covered with a little drywall compound and some paint, these become nearly invisible.

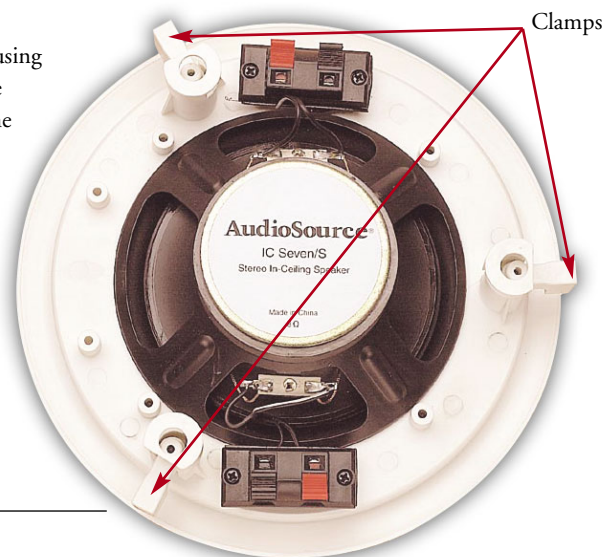
Plan Ahead

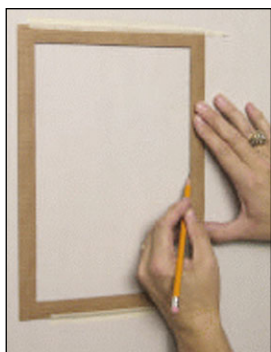
First off, decide where your amplifier will be and where you want the speakers. You can mount in-wall speakers in ceilings or walls, which can be helpful when your placement options are restricted by a window or a hallway. Remember that these speakers, once installed, cannot be easily moved. Try to avoid areas just above electrical outlets or switches, as there will likely be high-voltage AC wires in the vicinity. Once you have decided on the general location of each speaker, use your stud finder to locate the nearest studs to the left and right. The speaker will need to sit between these. Now consider in which direction the wires will go. If the attic is your choice, then get up there and see if you can access the top of the appropriate wall. In some cases, you may need to drill a hole through the wooden top board for the wires. Make sure there are no ducts or beams that will prevent you from getting the wires in. Same goes for the basement.

Cut The Hole

Unpack the speakers, read the directions, and find an included piece of cardboard or paper called a template.

This is a round in-wall housing as seen from the rear. Note the three clamps around the circumference. Before installation, these clamps are retracted, allowing the entire housing to fit through the hole. Once in place, tightening the screws causes the clamps to rotate outward to the position shown, where they grip the drywall from the inside.





Use a template to mark the location of the speaker. Make sure you align the template between wall studs.



You can use a simple putty knife to cut through drywall.



Remove excess insulation from inside the wall to create enough room for the speaker and then push the speaker wiring through the wall.



Connect the wires to the speaker and then secure the speaker and mounting hardware into place. You're nearly finished with the installation.

This is a drawing of the exact shape of the hole you will need to cut in the wall. Use the template to mark the hole on the wall with a pencil. Assuming you are reasonably certain you can run the wires to this location, it's time to cut a hole. You can cut drywall relatively easily with a firm utility knife. Make the outline lightly and then scratch progressively deeper into the wall. (This will create some messy dust.) Very old homes may have plaster walls (plaster layered on thin wooden slats called battens) that are much harder (and much messier) to cut. For these, you will need a reciprocating saw, which you can rent for only a few dollars. Once you have the hole cut out, you should see the underlying insulation, if present, with no studs or ducts in your way. Push on the insulation to see if it will easily compress to accommodate the speaker housing. If not, cut some out.

Run The Wire

Once your hole is cut, you can now attempt to run the wire to the speaker location. Most building codes require what is known as Class-2 cabling for in-wall applications; your dealer will know what that is. Take your coat hanger and tape the end of a spool of wire to it.


Then push the wire up or down through the wall (from the speaker location) in the space between the insulation and the drywall. It's helpful to have a second person stationed in the attic or basement to grab the wire as it emerges through the hole. Once the wire is out of the wall, feed it through to its destination at the amplifier. The professional way to link in-wall wires to your amp is to install a plug the size and shape of a wall switch using a similar template cutout technique. These are readily available at electronics stores.

Mount The Speaker

Once you've run the wire to its destination, cut it at the speaker end, leaving at least 6 inches of slack. Bare the ends of the wires and attach them to the speaker housing. Usually, clip-in sockets are provided on the housing for this purpose. Any speaker wire worthy of the name provides a way to identify which wire is which (even if this is only a rubber ridge running along one wire). If they are color-coded, make sure the red wire connects to the red terminal on the speaker and the amplifier to avoid an out-of-phase connection. (If you do connect the speakers out of phase, the speakers will still work, but they may sound funny.)

Now comes the good part. Clamping the speaker to the wall involves either a traditional bracket that is inserted into the hole or, lately, a system that lets you clamp the housing to the surrounding drywall in one easy step, with no bracket. In this system, after you've pushed the housing into the hole, you'll use a screwdriver to turn the mounting screws. While turning the screws, a plastic armature rotates out and grips the inside of the wall. It is important that the speaker be firmly attached to the surrounding drywall to avoid buzz from vibration when the speaker is playing. Here's a rookie mistake alert: DON'T clamp in the speaker without attaching the wires first!

Final Touches

Now would be a good time to hook up the speaker to your amplifier and make sure it plays. If so, you can apply the grille to the housing by snapping it in place, and voila, you're done. If you want to paint the speaker grille, use a fine sandpaper to roughen the surface and apply thinned paint with a small brush to avoid blocking the grille holes with paint. 

BY ROSS MANTLE

VCR Tech Support

Keep Your Tapes Rolling

They have none of the pizzazz of the latest DVD players, and every tech guru on the planet declared their demise long ago, but VCRs are still very much alive and kicking. Why? First of all, it's likely that few users will bother transferring all those old VHS tapes onto DVD. Second, recordable DVDs and DVRs are still too expensive to fill the bill as a replacement method for taping tomorrow's "Simpsons" marathon. Third, VCR movies remain plentiful and cheap.

The advent of the VCR signaled one of the three truly revolutionary eras in television history. The first was the introduction of the TV itself, along with network broadcasting; the second was the introduction of color televisions. The VCR completely altered the concept of television programming: For the first time, viewers could choose when and what to watch. And this machine's importance goes even further than that because the VCR changed the movie industry, as well, letting people bring movies into their homes whenever they wished.

Let's face it, though: VCRs have their problems. They tend to be bigger and clunkier than DVD players, and they have tons of moving parts inside. Moving parts mean eventual problems, and if yours is one of the multitude of poorly functioning machines out there, now's the time to do something about it.

Problem: *When I'm watching a tape, the picture bounces around so much that it gives me a headache. Why isn't everything clear and solid?*

Solution: The most likely reason for this is also the oldest problem in the VCR book: tracking. Or, rather, lack of tracking. Each tape contains a control track, which contains the data necessary to ensure that the VCR plays it back to match the

recording speed to compensate for any stretching that might have occurred and to coordinate the signals with the playback heads. If the position of the tape against the head does not match the information on the control track, the video is out of sync, and this is the cause of the tracking problem. The tracking control on the VCR lets you coordinate the head and the track on your own, although all VCRs today offer automatic tracking, as well.

Tracking causes the most noticeable problems when you record a tape on one VCR and play it back on another. In some cases, the playback VCR cannot track the tape properly no matter how many adjustments you try to make. Before giving up, however, fast-forward the tape to a new position and try again. Sometimes the tape has been stretched at the beginning,

resulting in tracking problems that disappear further along the tape.

Problem: *I have dozens of VHS tapes, but I no longer regularly have my VCR connected to my TV. Can they be converted to DVD?*

Solution: Yes, of course. Just as you can convert audiocassettes to CD format, you can transfer your videotapes to DVD. As with pretty much everything else, you can get this done by a service company or you can do it yourself. For the latter of the two options, you need a DVD burner, either a standalone recorder, such as the Panasonic DMR-E55S (\$349.95; www.panasonic.com), or a DVD burner for your PC, such as the HP dvd420i DVD-RW drive (\$129.99; www.hp.com). Here we'll focus on only the PC-based DVD



Just as you can convert audiocassettes to CD format, you can transfer your videotapes to DVD.

recorders because they're cheaper and more plentiful than standalones, although their lower expense is nullified somewhat by the need for a video capture card in your PC. Many video cards double as video capture cards, however (the ATI All-In-Wonder series provides the best-known example), so you may already have this component.

To effect the transfer, run video and audio cables from the VCR output jacks to the corresponding ports on the video capture card (if available, use S-Video cables for better results than the standard RCA cables). Next, open your video-recording software. Windows XP's freely available Movie Maker 2.0 works just fine, as do packages such as Ulead's Video Studio 8. Start the tape and then start the capture when the tape reaches the point from where you want the video capture to begin. Once the capture is complete, save it to a video file in one of a variety of formats (your capture software will offer choices). Burn the file to a blank recordable DVD compatible with both your DVD burner and your DVD player, insert the disc in your player, and watch your new movie.

And prepare to be disappointed. No matter how good your software and DVD burner, the quality of the video will probably be less sharp than on the tape itself. This is simply a result

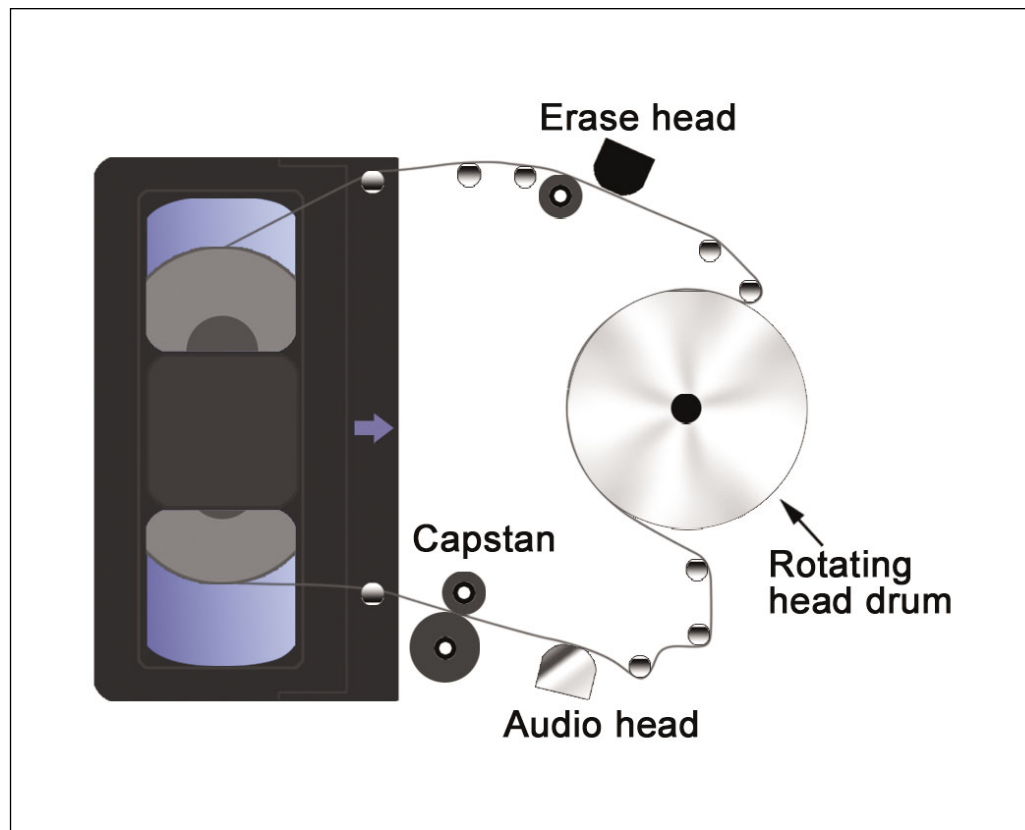
of the capture, and there's little you can do about it. But you can minimize the quality loss, and the resulting disappointment, by capturing and recording at the highest possible video resolution.

Problem: *I've broken a tape filled with video I can't replace.*

Solution: If you truly can't replace it, you have no choice but to try to splice it, and this operation is fraught with potential problems. Any truly important tape (the only copy of your daughter's first dance recital, for instance) should be sent to a repair shop,

where someone with experience can use a splicing tool to do the best possible job and can return the original and a copy of the tape to you. One example of such a service is Pacific Video Repair (www.pacificvideorepair.com), which will also make a VHS or DVD copy of the tape for you after it's repaired.

If you must try it yourself, be sure to buy actual splicing tape instead of using transparent tape or any other kind of common tape because not only will the common tape not stand the pressure caused by the pulling of the tape, the dirt it accumulates can also damage the VCR



There are lots of moving parts inside a VCR, and eventually they'll need maintenance.

heads. You can buy a tool such as the TAC Automatic VideoTape Splicer (\$39.95; www.videosplicer.com) to help you along, a much better idea than trying it yourself. However, keep in mind that any spliced videotape will be slightly thicker than the original, and a non-uniform videotape can cause problems with the tape's alignment and tracking.

Problem: *I've received conflicting advice from my friends on whether or not to leave a tape in the VCR when not using it. Is there an authoritative answer on this?*

Solution: Of course. And here it is: Leave the tape in. Now go phone your friends.

In fact, the best thing you can do for your VCR is to leave the same tape in as long as possible. The more you change tapes, the more dirt gets inside the VCR. Electronics and dirt don't get along well, and moving machinery gets along with dirt even less. Your VCR has both, and your primary goal, from a maintenance standpoint, is to keep dirt out.

But let's face it; people are always trying to tell us how to prepare things for low usage. Should you loosen the strings on your guitar after every use? (No, unless you don't plan to play it for months.) Should you take the batteries out of your portable CD player or portable radio? (Only if you'll be leaving it unused for several days.) Should you take the spaghetti sauce out of the back of your refrigerator (okay, that one's a yes), and so on. Generally, electronics are designed to be picked up and used exactly the way you left them last time, so don't go overboard when you mothball your VCR for a while.



A head-cleaning tape, such as this one from Maxell, can improve the quality of your VHS video.

Problem: *When I record a TV show, it always seems grainy, slightly unfocused, and just plain not very sharp.*

Solution: A number of things might be wrong here, but let's start with the two major suspects. The first is the quality of the tape. The fact is, tapes deteriorate over time, and the more you record over an already-recorded tape, the poorer the signal will become. One partial solution to this problem is to use a different tape

each time you record (an unlikely scenario because of the convenience of recording over an old tape, and the cost of buying a new tape each time you want to record something), and another is to buy the best tapes possible. Instead of getting the 8-pack at your supermarket, go to an electronics store and buy the highest quality videotape available. Ask for broadcast quality videotape, something you won't find in the bargain bin. For example, Maxell's Broadcast Quality S-VHS tape retails for between \$10 to \$16 each (depending on length).

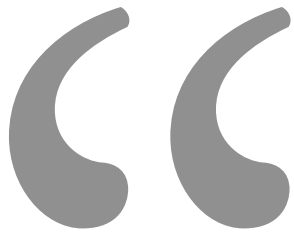
Another way to improve the quality of your recording is to record at higher speeds. As with audiotapes, the faster the recording speed, the better the playback quality. Always record at SP rather than SLP or EP, except when you have only one tape (or won't be available to change the tapes) and you're recording more than two hours of material. If you insist on getting all six (or eight) hours out of a single tape, you'll pay for it in playback quality.

If you combine the best videotapes with the highest speed, you'll get the best possible recording. And

given the price of blank tapes these days, why not? (The first blank tape we bought, purchased not long after the first appearance of VCRs, cost more than \$45, so stop complaining.)

Problem: *My VCR has started eating my tapes. Even when I put a brand-new tape in, there's a good chance the machine will mangle it.*

Solution: One thing to keep in mind at all times with VCRs is the sheer amount



The best thing you can do for your VCR is to leave the same tape in as long as possible.



of machinery inside. VCRs contain several moving parts, each one of which is capable of malfunctioning just enough to bend, fold, spindle, or mutilate your tapes. Combine these parts with the components of the tape itself (more moving parts), and you have the potential for a tape disaster. In fact, the most impressive thing about VCRs is that they work as consistently as they do.

Still, a VCR sometimes eats tapes, and you want it to stop doing so. First, as with practically every other VCR problem, clean the heads and, where possible, clean anything else the tape comes in contact with. The next tip goes into detail about how to clean your VCR's heads, so here we'll skip past the cleaning part and into other possible causes of tape chomping. Depending on your VCR, your VCR's tape guides may need alignment, its rubber belts may have worn down and lost their ability to control the tape's movement, or it may have a worn-down pinch roller (a rubber roller that, working with the capstan shaft, pulls the tape across the heads). It's even possible that a small object has fallen inside the machine (according to some electronics repair experts, an entire generation of young children have apparently had a field day using the tape opening as a mini garbage disposal).

As long as you're willing to open your VCR, and as long as you have the patience to figure out which part is which inside, you can replace the belts, align the guides, get rid of the foreign objects, and replace or clean the pinch roller yourself. If the only other choice is to toss the machine out, why not

give it a try? Be sure to have some test tapes to work with, however—tapes you don't mind losing if the repairs don't work. If you want an experienced repair technician to fix the machine, be sure to get an estimate before you authorize the repair. Chances are, repairing the VCR costs as much as buying a new one.


Problem: *I want to clean my VCR's tape heads, but my know-it-all brother has told me not to buy head-cleaning tapes to do this. Please tell me he's wrong.*

Solution: Alas, he's correct, at least according to many technicians. Some repair people do recommend starting with a head-cleaning tape, but even here you're warned not to expect very much from the attempt. Head cleaning tapes do more to smear the dirt on the heads rather than remove it, and at their worst they can damage the heads. There's no consensus on whether these things will actually harm anything, but there's certainly a consensus on the fact that they often don't work. The main problem lies with dirt that is caked on the heads and that require more pressure to remove than the head-cleaning cassette can provide.

So here we'll recommend a kind of compromise. If your picture is snowy or your audio is somewhat garbled, and assuming that you've checked that the cassette itself isn't defective, try the following steps. First, put a brand-new tape in the VCR and let it play through; the continual pressure might dislodge any dirt (use a new tape to ensure it has no dirt of its own to add to the mix). If that doesn't work, buy a high-quality

head-cleaning tape (preferably a dry type rather than a wet type) from a well-known company and run it through to see if the problem disappears. Examples include Maxell's VP-100 VHS Head Cleaner (in Dry or Wet versions), which sell for about \$8 each, and Scotch's AV-105 High-Performance VCR Head Cleaner, which costs roughly \$9. If you still have problems or if the problem is so extensive to begin with that you can barely even see the video, then clean the VCR manually (or take it to a repair shop, of course).

There are numerous VCR cleaning kits available. Don't use cotton swabs such as Q-tips, but rather chamois VCR swabs such as those at www.iglou.com/studiosound/cleaning.htm, where you'll also find a complete VCR kit. To clean the heads, open the VCR, locate the heads, and wet the chamois stick with the cleaning solution. Rub the stick lightly across the heads horizontally (you can damage the heads if you rub vertically), and let them dry after you've finished. Now, locate the drum and the capstans and clean them, as well. (You can use cotton swabs for these.) You can also clean any other metal piece against which the tape passes in this manner, but be sure not to get cleaning solution on anything rubber, such as the belts.

When you've finished and you're certain that all components are fully dry, replace the cover on the VCR, connect it to a TV, power it up, and see if you've solved the problem. 

BY NEIL RANDALL



Lighten Up.

It wasn't so long ago that if you wanted to bring your data with you, your hardware had to come too. Well, that's all in the past now thanks to the new SanDisk Cruzer™ Mini. At under half an ounce, the Cruzer Mini goes anywhere, and with up to 256MB of flash memory, it takes a lot with it. Hi-speed USB 2.0 compliant, SanDisk's Cruzer Mini lets you transfer data faster than ever before. And at less than 8mm thick, all it needs is a single USB slot. Just drag, drop, and go. It's all about convenience – no extra hardware, no worries.

So whether you're installing utilities or updating print drivers for the umpteenth time, you can take your files with you wherever you go – and you won't even need your dolly.



For more information on SanDisk Cruzer Mini, visit www.sandisk.com/smart



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CE DEJARGONATOR:

DivX

Data compression is one of the most important aspects of digital video. Without it, only a few minutes of video would fit on a digital videotape, CD, or DVD, but there's a trade-off. To achieve the best possible compression, lossy techniques are used that discard redundant and extraneous video information that always results in at least a slight reduction in picture quality.

The goal is to achieve the highest level of compression with the lowest effect on video quality. DivX is a lossy video compression codec (encoder/decoder) that is among the best in the world at doing just that. It competes with other popular codecs, such as Microsoft's WMV (Windows Media Video) and Apple's QuickTime video, and is based on the standard MPEG-4 (Moving Picture Experts Group-4) video codec. Commercial DVDs use older MPEG-2 compression to squeeze a few hours of video onto a single-sided, single-layer 4.37GB DVD, but MPEG-4 (and by extension DivX) compresses video enough that those same few hours


fit on a 650MB CD while retaining a comparable level of video quality.

Encoding videos in DivX format requires installing the latest DivX codec (free; www.divx.com) and using it with a third-party encoding application. Roxio's Easy Media Creator 7 (\$99.99; www.roxio.com) is a popular suite that can encode in the DivX format—as long as the DivX codec is installed on the computer—or use a standalone encoding product, such as DivX's full-featured Dr. DivX (\$49.99; www.divx.com).

Most people don't need to encode DivX videos but are instead interested only in watching downloaded or streamed DivX movies (AVI [Audio Video Interleave] and ASX [Active Stream Redirector], although not all AVI and ASX movies use the DivX codec). To watch DivX movies, you must download and install the free DivX codec, available at Divx.com. Click the DivX tab at the top of the page and then click the Standard DivX Codec (FREE) text link. Double-click the icon for the downloaded software and follow the prompts

to install the codec so that Windows Media Player and other applications can access it. Installing the codec also installs the latest version of free DivX Player software, which plays DivX movies. To access this program, click Start, expand Programs (All Programs in Windows XP), expand DivX, expand DivX Player, and click DivX Player.

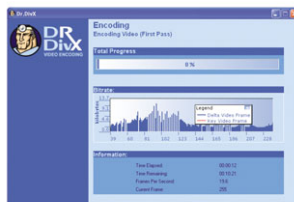
You'll usually find videos encoded in DivX format on the Internet, and you can play them on a computer. You can also now find DVD hardware, such as the Philips DVP-642 (\$79.99; www.philipsusa.com), so you can burn CDs or DVDs containing DivX files and then play those files on a television set. Look for the DivX logo on DVD players to find equipment that can decode the format.

Don't confuse the current DivX codec with the older and unrelated DIVX (Digital Video Express) DVD format. Circuit City created and used DIVX technology for pay-per-view DVDs, but the company discontinued it in June 1999. 

BY TRACY BAKER



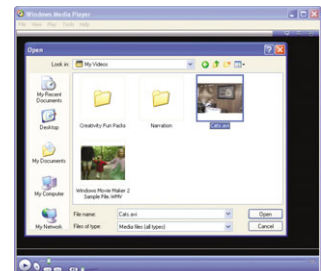
The original video feed looks great but consumes far too much space to be viable for easy downloading.



The original video is fed into the DivX encoder, which compresses the feed and converts it into the DivX format.



The converted video is opened using DivX Player or another multimedia player (we recommend Windows Media Player, as seen here) that has the DivX codec installed, and the compressed data is decompressed for viewing.



The final video retains much of the quality of the original feed but requires only a fraction of the original's storage space.

SACD vs. DVD-A

The High-Resolution Audio Showdown



When the compact disc was introduced in the early '80s, it seemed to provide a solution to a problem nobody was really having. Fantastic-sounding high-fidelity music was available on vinyl LP for home stereo users, and cassette tapes provided a rugged and practical way to take your music with you. Nonetheless, consumers were blown away by the superior sound quality of music on CDs, and the compact disc went on to become the most successful prerecorded music format in the world. Today, with more than 800 million CD players and a whopping 14 billion CDs scattered across the globe, it's hard to imagine how we lived without them.

However, for the last several years, CD sales have been declining. Some analysts blame the trend on Internet MP3 downloads and widespread music piracy. Others explain it by citing high prices and public ambivalence toward popular music. In a frantic effort to lure consumers back to music stores, record companies are again beginning to present music listeners with a solution to a problem they're only vaguely aware they have: the limitations of the compact disc. The idea is similar to the concept that used to drive CD sales. If the music sounds dramatically better, the emotional attachment to a tangible object

will sell it over the cheaper, more convenient portable format—in this case, MP3.

Only this time there are two formats vying to replace the aging technology we've all come to love: DVD-A (DVD-Audio) and SACD (Super Audio CD). Both formats provide high-resolution, multichannel audio that sounds dramatically better than both CDs and the low-quality MP3s made from them. The two new audio technologies have much in common but also some striking differences in capabilities that make deciding which format to support a difficult proposition for CE shoppers. To complicate matters further, the features of each format are only part of the equation. Market share and content availability will ultimately determine which format is more valuable to the consumer. The Betamax VCR that our VHS VCR is resting on still provides us a nostalgic sense of technical superiority but does little else because we can't get tapes for it.

In this article we'll examine the new formats as compared to both regular CDs and MP3s; the titles currently available for each; and which format, if any, will eventually prevail.

I Want My, I Want My MP3

MP3 digital music downloads exist because of their convenience. The

ability to acquire only the songs you desire and to keep them without shuffling dozens of fragile optical discs around is a huge advantage. Of course, making MP3 files so small and portable requires a trade-off. The MP3 format works by discarding the audio information that's least likely to be missed, but it's still reducing the quality of the recording. The result is music with uneven bass and harsh treble. What's more, the balance of loud and soft sounds, or **dynamics**, of the music is disturbed, usually in the direction of making the song uniformly loud with less detail. MP3 is the audio equivalent of watching a movie through a very dirty car windshield—you can follow the plot, but it's not pretty.

The key question is: Do consumers care? Most listeners hear their digital downloads either through relatively low-quality computer speakers or through headphones while they're walking, exercising, taking the subway, or doing some similarly noisy activity. In those situations, the pristine texture of high-resolution audio would be lost anyway to the playback system and surrounding environment, so MP3s are good enough.

Still, the emotional power of sparkling and transparent sound is undeniable. Many experts believe that the public isn't clamoring for high-resolution audio simply because they don't know what

they're missing. But even if they find out, the appeal of SACD and DVD-A won't supplant the MP3 in terms of convenience or portability. If they're ever popular, it will be among music enthusiasts listening with high-fidelity stereo systems and home theaters.

When Formats Collide

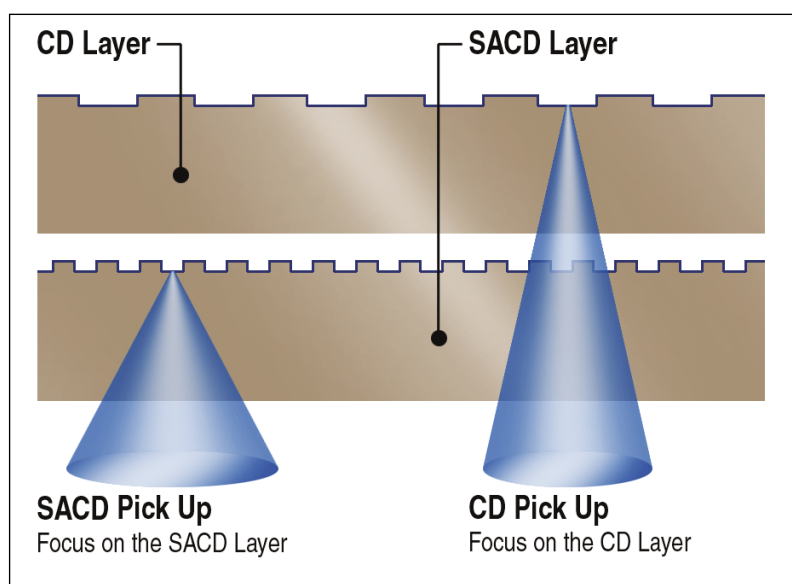
Both SACD and DVD-A are built on DVD technology. This means that the discs look just like the 12cm-wide and 1.2mm-thick optical discs we've grown to love, and they both store music in a digitized format. In order to understand the difference between them, you need to know a little bit about how digital audio works. CDs and computer WAV files both store audio using a system called **PCM (Pulse Code Modulation)**, which records a series of numbers called samples representing the amplitude, or the height, of the audio waveform at regular intervals in time. Then, during playback, the system essentially makes a bar graph approximation of the original audio wave and smoothes it to make the audio signal. PCM systems differ in the rates at which they take samples and the **word-length**, or resolution of each sample. CDs have a sample rate of 44,100 times per second

(44.1KHz) and a word length of 16 digital bits, meaning that each sample can range across more than 65,000 values, and the CDs store audio in stereo, meaning that there are two independent audio channels, one for each speaker in a two-speaker system.

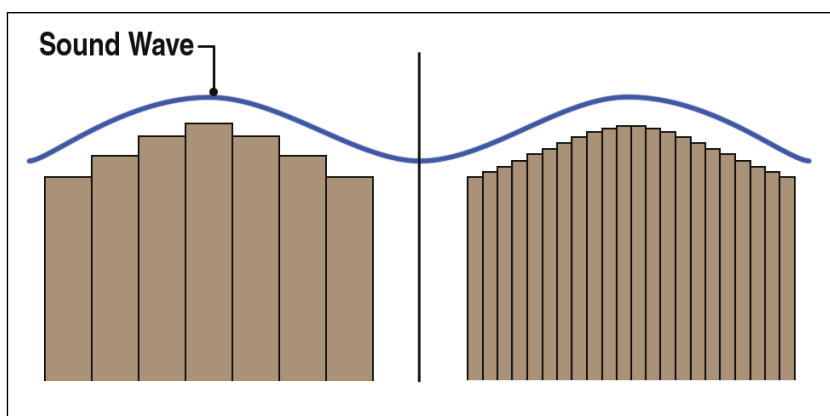
By contrast, DVD-A allows for word lengths up to 24 bits (which permits more than 16.7 million possible values per sample) and sample rates up to 192KHz, as well as multiple surround channels. The format provides a fair amount of flexibility as to how the audio is encoded, letting producers trade more channels for lower sample rates, provided the data rate off the disc remains below the 9.6Mbps (megabits per second) limit imposed by DVD technology. To push the boundaries of the disc system, DVD-A uses a compression system called MLP (Meridian Lossless Packing). MLP is a **lossless** scheme similar to file compression programs such as WinZip, meaning it reduces digital file sizes without losing information or reducing audio quality. The player can reconstruct the original file exactly, letting DVD-A get away with more channels at higher quality. Currently, the most common configuration used with DVD-A is 24-bit 96KHz audio in 5.1 surround (five speakers and a subwoofer).

SACD, developed by Sony and Philips, the same giants responsible for the CD format, uses a completely different system called Direct Stream Digital, or DSD. DSD trades a lower word length for a much higher sample rate. In fact, DSD word lengths are only 1-bit, and the sample rate is a staggering 2.8224MHz (2.8 million samples per second). It might seem that 1-bit words would lead to a tremendous loss of resolution, but the system uses them in a very different way than PCM. Rather than representing the actual waveform height at any given time, DSD words represent whether the height is increasing or decreasing. The quick succession of incremental changes produces smooth transitions between amplitudes in the finished audio signal. In all, DSD is a more advanced yet simpler system that lets engineers record and play back audio with fewer processing stages, eliminating the need for the complicated filters in PCM systems. Like DVD-A, SACD uses a lossless compression system called DST, or Direct Stream Transfer, to pack its data onto the disc. DST accomplishes essentially the same 2:1 compression ratio as MLP, also with no reduction in quality.

The jury is still out on the question of which format sounds better overall, but experts generally agree that the results are similar. The striking difference between them is found in SACD's surround configuration and backward compatibility. SACDs can be two-layer hybrid discs. The top layer is a high-density DVD layer that stores both a two-channel stereo DSD recording and a separate six-channel surround-sound version, both of which are readable in SACD players. The bottom layer is a standard CD recording that's compatible with all of the 800 million CD players already in use. You can play these hybrid discs just like all your old CDs in old players, albeit with the familiar lower-resolution sound. SACD doesn't provide producers as much flexibility in choosing the number of tracks and the specific details of the audio encoding, but it lets them include standard CD audio along with high-fidelity stereo and surround mixes.



You can play hybrid SACDs on standard CD players, as the discs have both an SACD and a CD layer.



Analog audio that is converted to a digital format is sampled at regular intervals. The more frequently the audio is sampled, the more closely the digital version will sound like the original analog signal.

Money For Nothing? Pics For Free

Both of the new formats were designed primarily with audio quality in mind, but in an effort to entice consumers with bonus content, DVD-A and SACD allow for extra digital information to be included on the disc. DVD-A is the most flexible and can include interactive menus, liner notes, lyrics, and even music videos. In fact, anything that can be put on a DVD-ROM or DVD video can also be put on a DVD-A. The same is true of SACD, but in a more theoretical sense. The SACD specification has the same storage space available and technically accounts for such graphical tidbits, but few SACD discs or players currently implement them. The result is, if you want the extra content, for now your best bet is to go with DVD-A.

Of course, the features of each format are useless if there aren't any discs to play. A quick scan of music stores shows plenty of titles available for both formats, priced about the same. For example, at Amazon.com, "Hotel California" by The Eagles is available on DVD-A (\$17.98), while Norah Jones' "Come Away With Me" can be found on hybrid SACD (\$18.98). Some titles may be available in both formats. Philips claims that about 1,500 SACD titles have been released. The best estimates put the DVD-A tally

at a bit more than half that. Both formats have been adopted much more thoroughly by classical music labels, but if your interests lie in popular music, finding the high-resolution audio titles you want is still a hit-or-miss proposition.

Despite the greater number of titles available for SACD, consumers seem to be more aware of its competition. A 2003 survey commissioned by the RIAA (Recording Industry Association of America) found that when it asked respondents what formats they purchased music in, 2.7% of respondents named DVD-A, while only 0.5% chose SACD. However, when the actual sales figures were examined for the same year, DVD-A only sold about 400,000 discs compared to 1.3 million SACDs. Vinyl LPs sold about 1.5 million copies, and CDs a staggering 745.9 million.


Two factors can account for the discrepancy between consumer awareness and sales. The first is that people are confused about the branding of the formats they're buying, either confusing SACD with DVD-A or (more likely) DVD-Video with DVD-A. The second is that people are buying hybrid SACDs without realizing that they're getting the high-resolution content. It's also worth noting that almost none of the SACD titles sold included surround-sound content, while nearly all of the DVD-A titles sold did. It seems that each format is developing a

niche: SACD with the "Stereophile" crowd and DVD-A with the surround-sound jocks. Regardless, SACD has jumped out to an early lead, probably because its hybrid discs can be stocked alongside normal CDs instead of being relegated to the consumer purgatory of the "audiophile bin."


Luckily, cost isn't stacking up to be a significant factor in the format wars. Most discs are list-priced within a dollar or so of each other, and the players are comparably priced.

We Can Work It Out


Electronics manufacturers have cut the Gordian knot of format choice for us with the invention of combo SACD/DVD-A players. Many new DVD players support both DVD-A and SACD, so some consumers are finding that they already own a DVD-A/SACD player. The Onkyo six-disc carousel DV-CP802 (\$499; www.onkyousa.com) is one such example. So, if you're wondering which format to buy, the answer may be both. Building a mixed collection will let you get more of the titles you want in high-resolution and allow you to tailor your library to the strengths of each disc. If you can't live without the SACD version of Michael Jackson's "Thriller," you'll be fulfilled but still be able to get the extras available on the DVD-A copy of The Doors' "L.A. Woman."

Whatever you decide, you probably won't be left out in the cold like we were with our Betamax players. The similarity of SACD and DVD-A and the number of discs already available for each all but ensure that more and more players in the future will be capable of playing both, whichever format eventually becomes more popular. And, of course, even if they aren't, you'll still be able to transfer your music collection to good old MP3. 

BY JOSEPH BELL



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**A+ PANEL
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Nov. 20, 2002 BenQ FP591
Hardware, Peripherals

BenQ
Enjoyment Matters

Sights & Sounds

House Of Cards

COMMENTARY BY
BRIAN HODGE



It was the big celebration of the summer, with fireworks and backyard barbecues from coast-to-coast. As I write this, the bottle rockets from July 4th are still ringing in my ears, although they were dim little pops compared to the festivities of a few days earlier. As you read this, it's mid to late summer, but I'll bet you're still talking about June 30th.

What happened on June 30th, you ask? Why, can it be that you overlooked our passing of one of the milestones on the road to all-digital TV? Don't feel bad about it. For almost everybody, the event came and went with a collective yawn. Here's the part to feel bad about: It deserved to.

One Step Forward . . .

In prior issues of this magazine, we've covered the timetable that the FCC (Federal Communications Commission) has laid out to take the nation from the half-century-old analog TV standard to digital. The FCC's plan is comprehensive and ambitious, its mandates are aimed at broadcasters and manufacturers alike, and it always seems to be pushing back the end date by another year or three.

But the June 30th deadline stuck to the plan. As of that date, at least 50% of newly manufactured TVs with screens 36 inches or larger must include a digital tuner and a slot for a cable card. Eventually, smaller TVs must include them, as well. Cable cards—roughly the size of credit cards, only thicker—are a way of kicking converter boxes onto history's technological scrap heap.

In theory, cable cards are a swell idea. Like converters, they let you receive the encrypted service tiers and premium channels to which you've subscribed, but they do it more efficiently. No scuffed rental box fighting for space with your other components

or center channel. Fewer power and signal cables to connect. One less remote control. Just the convenience of plug-and-play.

There's only one problem: Cable companies hate the card. For now at least, they would much rather you stick with the box.

Two Steps Back

If you're a digital cable subscriber, you're still in the minority of early adopters: around 30% of the industry's subscription base.


You may remember your delight after you made the switch from analog and started playing with digital cable's extra features: the interactive programming guide, video-on-demand, and other pay-per-view titles that you could order with a few clicks of the remote control. These and other features are possible because digital cable enables two-way communication between your home and your service provider.

But with cable cards, you can kiss these conveniences goodbye. Cards are designed only for one-way communication. Just like your old analog converter box. Actually, cards aren't intended to replace digital converter boxes. Rather, their alleged purpose is to start luring over the other 70% of the market. OK, so let's see: You get a card that lets you lose the box you've lived with for this long anyway, except it won't add any new features, and you'll have to buy a new, not-inexpensive set to accept it; nope, hard to see much stampede incentive here.

So when will two-way cards arrive? Enough years from now that nobody's even putting a number to it yet.

And it gets sillier. You can't fault cable companies for not being thrilled with this fledgling technology—a huge chunk of revenue comes from on-demand and pay-per-view titles, which you're more likely to order when they're waiting on the other end of your remote, rather than a less-than-user-friendly call to the cable company's automated phone system. So cable companies aren't being shy about their displeasure. They're just turning passive-aggressive about it, often requiring customers to schedule service appointments so a technician can drop by at his leisure and install the card for a hefty service fee. All this for an item you could pick up or have mailed to you, and easily pop in the slot by yourself.

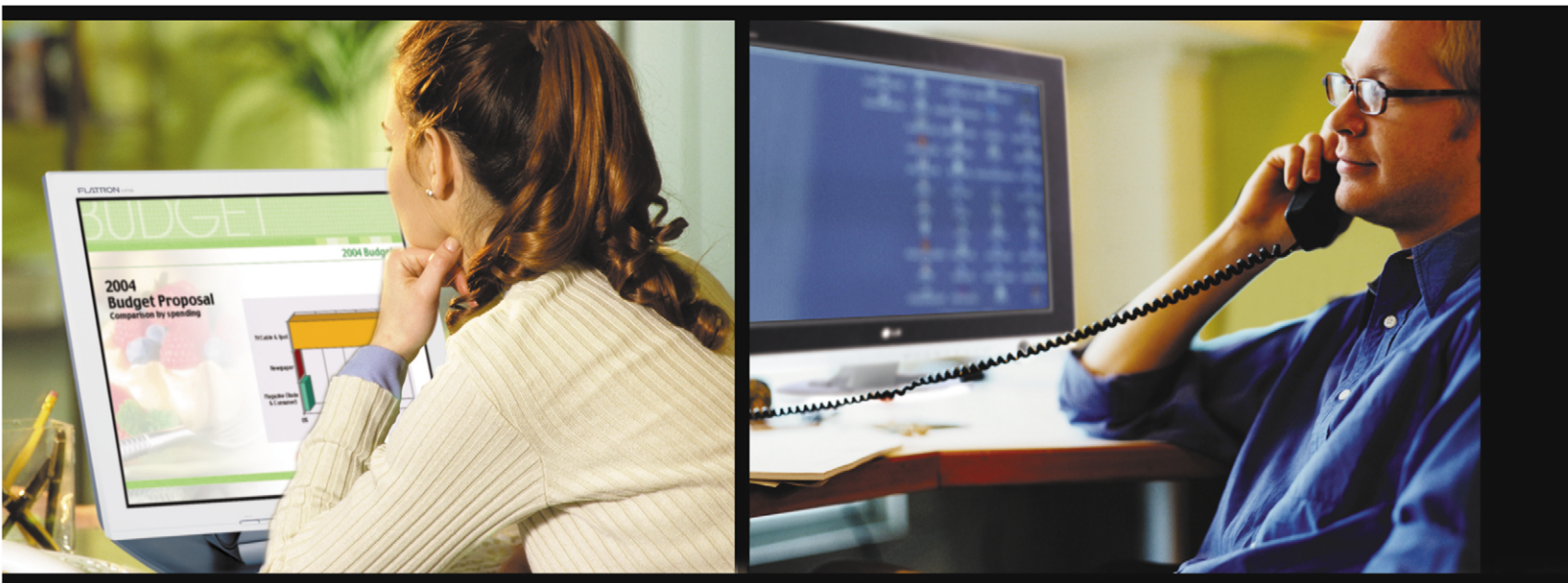
Instituting sweeping change is never easy, and it requires cooperation from parties always looking out for their own best interests. Still, when it comes to cable cards, I can't help but hear the voice of Christopher Walken, channeled from "The Suicide Kings":

"You didn't think this through too good, did you?" 



Although the cable card isn't any harder to insert than a floppy diskette, the service call could run you \$50 or \$60.

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Your Data Is On The

Air

36 Your Data Is On The Air

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Connect Your
House & Cut
The Wires

Face it: It's time to cut the cord.

So many CE and PC devices benefit from Internet access and file sharing that home networks are practically a necessity for electronics aficionados. Unfortunately, stringing Ethernet cable throughout the house is unsightly if you don't fish it through the walls (and difficult if you do), and even after the task is complete you're tethered to a wall jack.

The alternative is 802.11 technology, commonly known as Wi-Fi, and it comes in several varieties. The oldest, slowest, least expensive 802.11b standard has a maximum data rate of 11Mbps (megabits per second). For home networking 802.11g gets most of the attention right now and for good reason. It supports a faster maximum data rate of 54Mbps that can be boosted to twice that speed using data compression. Better yet, 802.11g is backward-compatible with 802.11b hardware, so early adopters can upgrade piecemeal or new users can save money by using cheaper 802.11b equipment in certain areas of the house.

802.11a is a wireless standard that boasts the same data rate as 802.11g hardware but operates in the 5GHz spectrum instead of the 2.4GHz used by 802.11b and 802.11g. As a result, it's not compatible with 802.11b. In-Stat MDR reports that 802.11g equipment, along with hardware that uses both 802.11g and 802.11a technology, accounted for nearly 50% of total wireless sales by the end of 2003, showing that the slower 802.11b equipment that formerly dominated the market is finally being edged out by the newer, faster technologies.

Regardless of the wireless network technology you choose, it's guaranteed to be suited for sharing an Internet connection. Most broadband accounts aimed at home users don't exceed a 6Mbps data transfer rate (and many are slower), so even 802.11b equipment is sufficient.

Hardware costs are falling, and wireless networking is big business. In-Stat MDR reported that more than 22.7 million wireless NICs (network interface cards) and access points sold in 2003,


Creating a wireless home network is easier and cheaper than ever, but there's much more to it than simply plugging in a few hardware components and firing up an Internet browser.

representing a 214% increase over 2002 sales, and predicts that sales should reach nearly 30 million units in 2004 and more than 40 million units by 2007. In terms of dollars, a similar report by Infonetics Research predicts that revenue from wireless networking hardware will nearly double from \$1.49 billion in 2003 to \$2.94 billion by 2007.

Creating a wireless home network is easier and cheaper than ever, but there's more to it than plugging in a few hardware components and firing up a browser. For info about selecting and installing wireless hardware, see "Wi-Fi 101" (page 38) and "Freedom From The Wire" (page 44) in this section. Wireless networks are useful for more than simply connecting PCs, and you can read all about these extra benefits and various wireless-enabled devices in "Beyond The Basics" (page 48). Finally, "What A Wireless

World This Could Be" (page 54) provides the lowdown on a variety of modern home-networking equipment, so you'll be able to tell a wireless router from a wireless bridge and shop for products that will help create and expand your wireless home network.

Although the articles in this feature package will help you build a powerful home network, keep an eye out for upcoming wireless technologies that should operate at much higher speeds than today's standards. A recent ABI Research report highlighted three promising emerging standards, including powerline networking (networking through a home's existing electrical outlets), UWB (Ultra Wideband), and 802.11n. According to the report, UWB and 802.11n are poised to be the biggest competitors in the future wireless networking market. UWB should offer data rates of 100Mbps to 200Mbps in its 1G products, which are expected to be available in 2006 or 2007.

Later generations of UWB products could achieve data rates of 480Mbps, but ABI expects that 802.11n equipment will dominate the market by then. The current data rate goal for 802.11n is 500Mbps, but the real benefit to 802.11n is its 100Mbps+ data throughput rate, which is the amount of data it can transmit after communications overhead and other factors are accounted for. (The data throughput rate is always lower than the maximum theoretical data rate advertised on boxes and touted in spec sheets.) That's enough bandwidth to support multiple streams of real-time video, which should make 802.11n ideal for the types of streaming media applications that interest consumers. Imagine watching several pre-recorded shows on different TVs in the house while piping digital music to a different room, through the same wireless network connection. No matter which standard emerges as the overall market leader, at least it's guaranteed that future wireless products will be faster than the seemingly speedy 802.11g and 802.11a products we enjoy today. 

BY TRACY BAKER

Wi-Fi 101

Disconnect The Wires To Share Internet Connections & Information

Over the past few years, personal computing has undergone a quite dramatic change. Dial-up users are dwindling rapidly, and computers are no longer the luxury items they were once considered to be. And technology formerly relegated to big business has rapidly made its way into the hands of small-office/home-office consumers. Computers themselves have gotten so inexpensive that it's now possible to get an entire system, complete with a large monitor and printer, for less than \$500. Networking equipment has also become so affordable that you can buy some high-speed routers, firewalls, and switches for well under \$100 each. Combine these two trends with the facts that broadband Internet connections have now found their way into more than 45% of the Internet-connected households in the United States alone and that multicomputer homes are now common, and it's no wonder that the desire to share a broadband Internet connection and transfer files among multiple computers has become a necessity for many users.

One way to connect the systems to each other in a SoHo network is to wire them using standard Ethernet cables,

hubs, and switches. A wired network is often the most desirable configuration because it is fast, relatively inexpensive, and secure, but unless you've just begun building a new home or office, wiring a network can be a daunting task. Plus, who wants nasty wires strewn across his home? A simpler way to build a network in an existing space is with Wi-Fi equipment. Wi-Fi is a term used to describe a whole family of wireless networking products that eliminate the need to hard-wire an office for connectivity.

How It Works

Wi-Fi technology, or 802.11a/b/g, works much like that digital cordless phone sitting on your desk. The microphone in the handset picks up the sound of your voice, and processors in the phone convert the sound into a digital signal, which is then transmitted to the base unit. The base unit in return takes the data coming in from the phone line, performs a similar conversion, and transmits the signal back to the handset. This

constant, two-way communication somewhat mirrors the functionality of the wireless network. Think of a WAP (wireless access point) or wireless router as the base unit of a cordless phone and think of the wireless NICs (network interface cards) as the handsets. The WAP or router is your hardwired interface to

You can use the D-Link DCS-2100+ Wireless Internet Camera to monitor a location by remotely connecting to it via the Internet.



Wi-Fi Standards & Specifications

Specification	Common Name	Frequencies	Range* (in feet)	Compatibility	Bandwidth	Applications	Availability
802.11a	Wi-Fi	5GHz	~ 200	802.11a	54Mbps	SoHo Networks	Now
802.11b	Wi-Fi	2.4GHz	~ 300	802.11b	11Mbps	SoHo Networks	Now
802.11e	Wi-Fi	2.4GHz, 5GHz	~ 300	802.11a/b/e/g	54Mbps	SoHo Networks	2005
802.11g	Wi-Fi	2.4GHz	~ 300	802.11b/g	54Mbps	SoHo Networks	Now
802.15.1	Bluetooth	2.4GHz	~ 35	802.15.1	<1Mbps	Cable Replacement	Now
802.15.3	Ultra Wideband	3.1GHz to 10.6GHz	~ 35	802.15.3	325Mbps	Personal Area Networks	Q2 2005

*Depending on construction, building materials, and room layout. Concrete and metal walls will drastically reduce the useful range.

an existing wired network or to a broadband modem. It communicates using radio signals with the wireless network adapters installed in your computers. The wireless link between the adapters installed in your computers and the router/WAP eliminate the need for Ethernet cables. This is a rather simplified explanation of the technology, but this is basically how any wireless network functions.

The most common Wi-Fi equipment use the 802.11b and 802.11g standards. These devices transmit and receive data using RFs (radio frequencies) in the 2.4GHz band. Newer devices that use the 802.11a standard broadcast in the 5GHz frequency band, but they aren't quite as common as the more established and affordable 802.11b/g products. 802.11b devices were the first to be widely available, and they offer up to 11Mbps (megabits per second) of total bandwidth and have an effective range of about 300 feet when unobstructed. Indoors, however, walls and the overall layout of the building will probably cut the effective range of 802.11b devices in half. 802.11g products are similar to 802.11b products. However, through the use of a higher-speed extension, they offer a maximum of 54Mbps of total bandwidth. Products that conform to the 802.11a standard also offer up to 54Mbps of bandwidth, but they

The most common wireless networks consist of a router or access point and wireless NICs for each of the computers that will be part of the network.

transmit and receive data in a different frequency band and have a shorter range. 802.11a devices have an effective range of about 200 unobstructed feet. Because they use a different frequency band, though, 802.11a devices are less susceptible to RF interference than products that use 2.4GHz frequencies.

What You'll Need

To construct a wireless network, you'll need a few basic components. The most common wireless networks consist of a router or access point and wireless NICs for each of the computers that will be part of the

network. For example, let's say we're configuring a wireless network in a home that has two desktop computers, a cable broadband Internet connection, and a laptop. The first step to building the network would be to connect the wireless router to the cable modem. When properly configured, the router then acts as the gateway to the Internet. The computers connected behind the router are assigned an unregistered internal IP (Internet Protocol) address, usually in the 192.168.X.X range. The router takes the traffic coming from the registered IP address assigned by your ISP and routes it to the proper internal

The router, such as the Linksys WRT54GS Wireless-G Broadband Router with Speed-Booster, is the interface to an existing network or modem.



How Wi-Fi Works

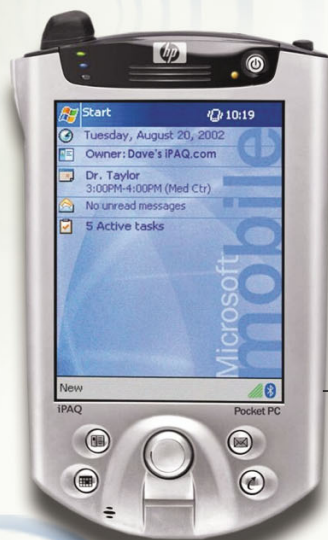
Provided you've got the proper equipment, setting up a wireless network is relatively easy and straightforward. A wireless router or access point is the heart of the setup. It connects to your DSL or cable modem and acts as the gateway to the internet and other wired portions of the network. Logging into the router to configure it to function with your particular ISP and setting up some pass keys for security purposes is usually all that is necessary to get started. When within range of the WAP/router, desktop computers, laptops, PDAs or other 802.11a/b/g equipped devices can then access the network and the Internet without having to run a single cable.

Internet

Cable or
DSL Line

Cable or DSL
Modem

Wi-Fi-enabled PDAs (Personal Digital Assistants) can access network resources or the Internet wirelessly when in the proximity of a wireless access point/router.



802.11a/b/g Enabled PDA



802.11 a/b/g
Wireless Router



Wireless-G PCI Adapter
(WMP54G)



Wireless Network PC Card
(WPC11)



A desktop computer equipped with an 802.11a/b/g wireless network adapter does not need to be connected to the router by an Ethernet cable. The wireless link between the PC and router allow the system to function as if it were wired to the network.

Most new laptops ship with some sort of wireless network adapter built-in. If your laptop does not have a wireless network adapter, however, you can buy an inexpensive one and easily install into any compatible PCMCIA slot.

Network
Cable



Wired Hub or Switch

Should you need to get a wireless signal in a remote location that is not within range of the central WAP/router or where a signal cannot be received because of a thick wall, for example, an Ethernet cable can be run from the central router to a switch or hub and a second wireless access point can be installed.

The WAP (Wireless Access Point) or router is the heart of a wireless network. All of the clients connect through the WAP/router, which acts as the bridge or gateway to a wired network and the Internet.

802.11 a/b/g
Media Player/Server



802.11 a/b/g
Video Camera

New devices, such as 802.11a/b/g-enabled video cameras and wireless media servers, have recently begun to hit store shelves. With the wireless camera, users can log in over the Internet and monitor a remote location and the wireless media server gives users the ability to play movies or music from any system available on the network.

Wireless Networking Dictionary

ad-hoc mode—This mode is used when two wireless clients communicate directly without using a wireless access point.

Bluetooth—A short-range wireless standard for use in inter-device, wireless networking (for example, between a PDA and a notebook).

directional antenna—A type of wireless antenna that radiates and receives radio signals in a single direction. Directional antennas are used to focus the signal through a path to a single point.

infrastructure mode—This mode is used when wireless clients communicate with each other through a wireless access point.

NAT (Network Address Translation)—NAT hides computers on the internal network by assigning them private IP addresses.

omnidirectional antenna—A type of wireless antenna that radiates and receives radio signals in every direction. Most of the built-in antennas on most wireless network cards, routers, and access points are omnidirectional.

war driving—The act of driving around with a Wi-Fi-equipped notebook PC or PDA looking for unprotected wireless access points.

WEP (Wired Equivalent Privacy)—The standard for encrypting data over an 802.11b/g wireless network.

Wi-Fi—The common name for 802.11a/b/g wireless networking technology.

IP address. This feature, known as NAT (Network Address Translation), adds a basic layer of protection between your computers and the Internet.

With the router in place and configured, the next step is to install wireless NICs in each computer. Wireless NICs come in many forms. Some are common PCI (Peripheral Component Interconnect) cards that install like any other PCI device, such as a sound card, for example. Others are made for laptops or other portable systems and conform to the PCMCIA (Personal Computer Memory Card International Association) standard. If your PC or notebooks don't have any available expansion slots, USB wireless adapters are also available. And there are CF

appear in a list as an available connection; click the Connect button, and you should be done.

Maintenance & Security

There are some disadvantages to a wireless network, however. There will usually be some maintenance involved to ensure that your router's software is up-to-date and that it isn't vulnerable to attack by worms, viruses, crackers, etc. Every wireless router and access point contains a small program, called **firmware**, that acts like the device's OS. Firmware is stored on a programmable chip inside the device. Like any other program, manufacturers occasionally release patches that will require you to

There are some disadvantages to a wireless network, however. There will usually be some maintenance involved to ensure that your router's software is up-to-date and that it isn't vulnerable to attack by worms, viruses, crackers, etc.

(CompactFlash) and SD (Secure Digital) wireless adapters available for high-end PDAs. Installing the adapter is usually a straightforward process. Insert it in an available slot or connect it to an open USB port. Then, when you power up the machine, the OS should detect the new device and install the drivers. The drivers will usually accompany the adapter on a CD or floppy diskette, but it's always a good idea to head to the manufacturer's Web site to see if updated drivers are available. Once the drivers are installed, reboot the system and run the wireless connection utility that came with the adapter to scan the airwaves for your wireless router. (Windows XP has built-in capabilities for managing wireless network connections.) If everything is functioning properly and you're within range, the router should

update your WAP's firmware. The patches usually fix bugs, patch vulnerabilities, or add new features. It would be a good idea to browse to the manufacturer's Web site at least once a month to see if updated firmware is available. (Refer to your documentation for specific update instructions.)

802.11b/g wireless networks are also susceptible to interference from a variety of other devices. Some cordless phones, for example, operate on the same ISM (Industrial, Scientific, Medical) band of frequencies, and microwave ovens often emit frequencies that can wreak havoc on a wireless network, as well. The problem stems from the fact that all of these products operate at similar frequencies, and the signal from one can easily interfere with the other. Wi-Fi equipment is designed to continue operating when

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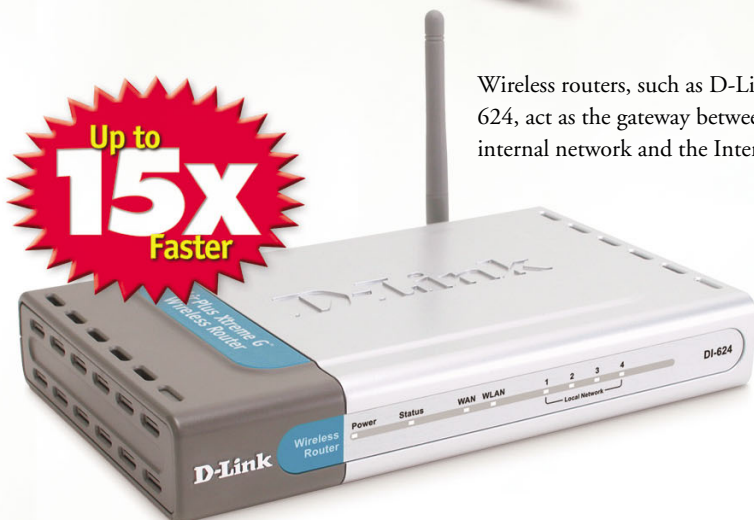
interference is present, but performance degrades considerably when conditions are not ideal. It's best to keep cordless phones and other devices that may interfere with your wireless network as far away from the computers and WAP as possible, but in the end there may not be much you can do other than buy a new cordless phone that operates in a different frequency band or upgrade the antennas on your WAP and wireless adapters.

Security is a major concern for all wireless networks, as well. With a wired network, an intruder has to gain physical access to the network to attach his systems. However, with a wireless network that's broadcasting signals hundreds of

feet in every direction, war drivers can stumble upon your network and use your Internet connection easily if it's not secured. **War driving** is the act of driving around with a Wi-Fi equipped notebook computer or PDA looking for unprotected wireless access points. It's a common practice, especially in urban areas. To help secure wireless connections and protect against unwanted intruders, virtually all WAPs incorporate WEP (Wired Equivalent Privacy) technology. WEP is a standard used for encrypting data over an 802.11 wireless network. To enable WEP, you'll have to log in to your router and assign a key or password. To gain access to the network, you or someone has to

When it's properly configured, a wireless network offers most of the performance of a wired network, with the freedom to access it from anywhere that's within range of the WAP.


The D-Link DWL-G520 incorporates D-Link's "Xtreme G" technology to increase theoretical peak throughput rates to 108Mbps, from 54Mbps on standard 802.11g adapters.



Wireless routers, such as D-Link's DI-624, act as the gateway between your internal network and the Internet.

enter the key at each client machine. There are other things you can do to help secure a wireless network, but the options are not as prevalent as WEP. With some WAPs, users can choose not to broadcast their SSID (Service Set Identifier), which makes it a bit harder to stumble upon their networks. The Wi-Fi Protected Access protocol is far superior to WEP, but these two tools may not be available to some users because they were developed after WEP and aren't widely available yet. If they are, though, we highly recommend using them to further secure your wireless network.

Inexpensive, Configurable & Reliable

Wi-Fi technology has matured to the point where it is now inexpensive, easy to configure, and reliable. When it's properly configured, a wireless network offers most of the performance of a wired network, with the freedom to access it from anywhere that's within range of the WAP. As is the case with any wireless technology, interference can be a problem, and you may have to take extra security measures to protect your privacy, but the convenience of a wireless connection is undeniable. 

BY MARCO CHIAPPETTA

Freedom From The Wire

If You Build It . . .

Like cell phones, wireless networking (Wi-Fi) has freed us from the tether of the cable, which might feel like a mixed blessing when you get that work email while casually surfing the Web from bed. But once you broadcast your wireless Internet access throughout your home, your laptop really becomes a laptop, and you'll appreciate the joys of longer battery life from modern systems. Browse the Web from your bed, IM (instant message) from the couch,

catch up on news over morning coffee in the kitchen. You'll wonder how you ever lived without Wi-Fi.

Setting up a wireless network can be straightforward, though not without its pitfalls. There's the obvious technical challenge of getting all the components to play nicely together and also securing your network from outside snoops and crackers. Once you have your network up and secured, you'll be able to explore the benefits of

having a network, such as sharing video and music, all free from wires.

The Setup

At the simplest level, you'll have three critical components: a broadband connection (either to a DSL [Digital Subscriber Line] modem or cable modem), a wireless access point (which can also be a router), and a wireless client in your PC.

Despite the Wi-Fi standard (for more details visit www.wi-fi.org), you'll find components don't always work together. Certified components can be incompatible, and you might spend many an hour trying to debug a scenario where your cable modem is working, it's properly connected to the router, and your PC sees the router, but you have no Internet access. We've dealt with situations where just replacing the router with another vendor's model cleared up the problems. Different vendors often use the same chipsets, which helps compatibility. We've had better luck with interoperability among the big players such as Netgear (www.netgear.com), Linksys (www.linksys.com), and D-Link (www.dlink.com).

But it's not just a sales pitch. You should buy all of your equipment from the same vendor for practical reasons, too. If you have to resort to the dreaded tech support telephone call, Linksys won't be able to blame D-Link hardware—or vice versa.

Most modern laptops have Wi-Fi built in, so you probably won't be able to stay completely in-house



Home Networking

with your network infrastructure. But be prepared to go online and download any updated firmware for your access point. Our laptop's internal Dell TrueMobile 1130 Wi-Fi card had problems talking to a Netgear MR814v2 router until we upgraded the router's firmware. Doing this can solve or prevent a *huge* number of incompatibility issues.

The Deal

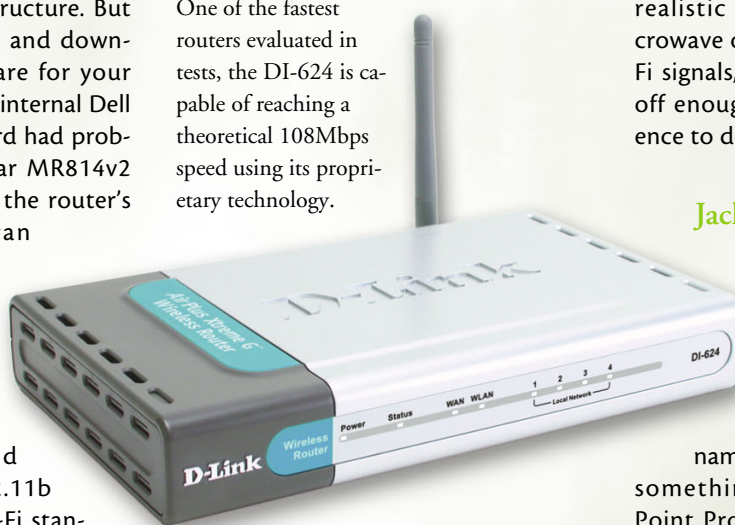
Although you can find some great deals on 802.11b (an older, and slower, Wi-Fi standard that maxes out at a theoretical maximum of 11Mbps [megabits per second]) equipment, skip it unless you're budget-constrained. You're better off buying an 802.11g router, which uses the same frequency spectrum and is backward compatible with 802.11b. In contrast to 802.11b, however, 802.11g increases the maximum throughput to a theoretical 54Mbps. (According to reviews and the vendor's own reps, however, you will probably only get about 20Mbps at reasonable distances.)

Another benefit to using the same company's hardware is that some vendors use proprietary technology to transmit over two frequencies, effectively doubling the throughput to 108Mbps, but you'll have to use hardware that supports that feature across the network. Again, your mileage will vary, but it will surely be faster than the 802.11g standard. 802.11g networks easily support playing MP3s and even video files across the network. And according to vendors, the latest 802.11g chipsets boost the effective range of their access points.

Location, Location, Location

What constitutes a good wireless-network setup? First and foremost, pick a good location for your **access point** (the piece of equipment that transmits your signal out into your home). You might be limited by the

One of the fastest routers evaluated in tests, the DI-624 is capable of reaching a theoretical 108Mbps speed using its proprietary technology.



location of your cable modem, but here there are things to keep in mind.

If you can mount it near the central wall of your house, taking into account that the signal gets projected in a flattened sphere, you'll be able to

What constitutes a good setup? First and foremost, pick a good location for your **access point** (the piece of equipment that transmits your signal out into your home).

cover the maximum amount of territory; the sphere will flatten out on the floor where you place your access point. Remember that the signal, like radio signals from your cordless phone, can be affected by concrete walls, pipes, and even nails and studs. Older apartment buildings in New York City are Wi-Fi's worst nightmare, with wiring, pipes, and dense plaster walls. An access point can fail to reliably connect to a nearby PC if that PC is a few short corners away—radio signals try to travel in a straight line, not down a zig-zagging hallway. You'll see that some of the advertised maximum ranges (of more than 300 feet indoors) for the latest routers are probably not

realistic in most actual homes. Microwave ovens can allegedly affect Wi-Fi signals, and even large motors give off enough electromagnetic interference to degrade your signal strength.

Jacking In

This is a good time to collect all the appropriate information from your ISP about your Internet account. Some DSL setups require a username and password, and they use something called PPPoE (Point To Point Protocol over Ethernet). Many cable modem setups, such as Time Warner NYC Road Runner, don't require a user ID or password. In all likelihood, your ISP hands out dynamic IP (Internet Protocol) addresses; if you have a static IP address, find out that IP address from your ISP. It helps to keep a single sheet of information on your Internet settings handy.

Remember, some ISPs won't support routers or hubs (Road Runner, for example), while others will (Verizon DSL, for instance). But the simple fact is, all the settings tech support provides for your PC will be input into the router, and the router will just appear like a PC to your ISP.

We recommend you set up a PC with an Ethernet network interface card to access the settings on your access point. It's very handy if you need to troubleshoot the wireless component. You'll also need two Ethernet cables initially: Your ISP should have provided one with your cable or DSL modem, and you should have one from your Wi-Fi access point or router package. Power up your



router and connect the cable/DSL modem to the access point port labeled WAN or Internet. If you have a hub, you'll probably have four other Ethernet ports for your wired network. Connect your PC via Ethernet cable to one of the ports. If you didn't have to enter any special settings, such as a password, static IP address, or DNS (domain name server), you'll probably see the front panel light for the Internet light up, and you should see one of the port indicators light up, as well. This means your Wi-Fi AP/router is connected to the Internet *and* your PC.

Even if you don't need to enter any special ISP settings, you'll need to enter the administrator setup for your access point. Check your documentation for the access point's IP address. For D-Link and Netgear routers, type <http://192.168.0.1>. You'll get a login screen, and you should just enter the default password. Some modern routers, such as the D-Link 624, will have a wizard that'll attempt to self-configure your Internet settings. You can run this if you like, but you should still double-check all the entries and enter any personal information such as your ISP login and password.

Using the D-Link router as an example, click the Wireless button. On the wireless configuration screen you'll be able to set your wireless settings, such as SSID and WEP key.

All new access point and routers now support 128-bit **WEP**, or **wired equivalency privacy**, which uses an alphanumeric key as a way of securing the data that travels back and forth between your PC and the router. You should also buy hardware that supports WPA (Wi-Fi Protected Access) and has an SPI (Stateful Packet Inspection) Firewall. We'll address SPI in more detail later.

Another feature to look for is an easy-to-administer user interface, which makes setting up your security measures less painful. Some wireless products have made strides in usability but still have a long way to go—the user interface still

often feels like it was designed for network administrators, not consumers.

Secure The Network

You'll need to secure your wireless network to prevent freeloading neighbors from sucking up your valuable bandwidth and keep out malicious visitors. This means doing several things. Here are mandatory measures:

Change passwords and identifiers.

Your router/access point comes with a preset password and preset network identifier, such as "linksys." Change your password and network ID, or SSID (Service Set Identifier) and do not broadcast your SSID.

Enable 128-bit WEP encryption.

You'll need a key or a pass phrase to

modern 802.11g access points support WEP and WPA.

Enable MAC (Media Access Control) address filtering. Each network adapter on your PC has a unique identifier called a MAC address. Most modern access points have a simple-to-use feature where you only allow specific MAC addresses to access your network.

Rotate your WEP key. You can set up to four keys on your hardware and choose which to use. Crackers monitoring your network traffic can actually decode your key given enough time. A cracker may watch packets move around your network for days or even weeks. If you rotate your key weekly, you'll let all of his hard work go to waste.

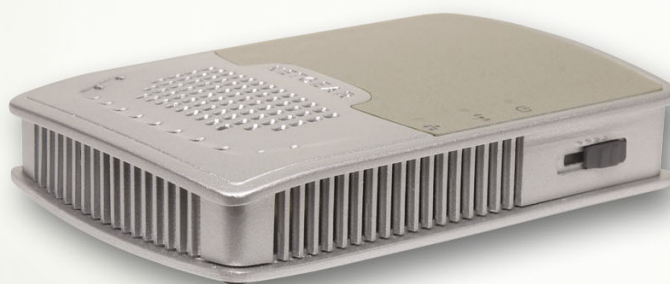
Change your WEP and WAP (wired access point) keys regularly. This is pretty inconvenient for you, too, but it will make life difficult even for a dedicated, skilled cracker.

Limit the number of IP addresses your access point will hand out. If you know you'll have only two systems on your network, only allow your access point to hand out two IP addresses.

Back on the AP administration page, change your SSID from "default" to your chosen network name, choose a channel, enable

128-bit WEP encryption, and enter a WEP key. At the very least, enter the WEP key as Key 1; you'll need to know the key and key number when you configure your clients. This is the minimum amount of security recommended for a wireless network setup; you can now set up your first wireless client. It's not so easy to disable SSID broadcast on D-Link routers; go to the Advanced tab, click Performance, and scroll to the bottom of the screen. On Netgear access points, go to Advanced/Wireless Setup.

Assuming that your wireless client is a laptop, you'll either have a built-in network card (part of the Intel Centrino specification, for example), or an add-on PC card (you'll need to install the PC card drivers). Boot up your laptop, insert your



The WGR-101 is a portable wireless router perfect for hotel rooms and other broadband connections where you'd want instant Wi-Fi network access.

generate a **key**, which is a string of hexadecimal digits. Ideally, this key should be random, but using a pass phrase, or even repeating an easy-to-remember string is better than nothing. The rationale is, given the number of open networks out there, a cracker is less likely to want to go to the effort to hack your WEP key unless, of course, she knows you have something valuable or has specifically targeted you.

And here are a few optional precautions you can take to further protect your network:

Enable WPA, if your hardware supports it. WPA requires a user to enter a 128-bit encrypted password to even gain access to the network; this is a layer on top of WEP, a gatekeeper. Nearly all

Home Networking

PC card or turn on the Wi-Fi subsystem (for Centrino notebooks), and go to My Network Places/View Network Connections. You should see an icon for Wireless Network Connection, so right-click and select Properties. If you want to access other systems on your network, take this time to click Install, select Protocol, and add the NetBIOS protocol. Go to the Wireless Network tab. Click Add, enter your SSID, remove the checkmark from the box that says the key is provided automatically, and enter your WEP key. Leave a checkmark in the Data Encryption (WEP-enabled) box and remove the checkmarks from the Network Authentication and Ad-Hoc Network boxes.

Click OK and wait for your system to scan for the network. You should be online and ready to access the Internet.

You can now use the laptop and Windows in each room to tune your access point's antenna position. Right-click Wireless Network Connections and choose Status to see the signal strength of your wireless card at any given time. If you're getting signals in the red, or any low signal strength, you'll want to reposition the access point by even a few feet to see if that nudges the signal strength to an acceptable level, but be sure to check how that affects coverage in other rooms, as well.

If that doesn't work, you'll want to look into a **signal repeater**. This is a small device that takes your access point's signal and repeats it in both directions. At press time, Apple had released its AirPort Express (\$129; www.apple.com), and the D-Link DWL-G800AP (\$89) is also a serviceable repeater. Obviously you'll want to place this where your access point's signal strength starts to fall off but is still strong enough to provide a good connection.

You can also use your system's USB port or Ethernet port; USB Wi-Fi adapters are easy to use, but you'll need to install software drivers on your system. These devices are the size of flash memory drives, and you can hang one on your keychain. If you have a computer with an Ethernet port, you can use an Ethernet Bridge, which looks like a standard Ethernet network connection to your TiVo or PlayStation 2,

though you might need a PC to set the initial configurations.

The Sting

Part of the beauty of a Wi-Fi network is the ability to use your laptop wirelessly at home *and* outside (in cafes, hotels, and even college campuses), anywhere with a public Wi-Fi network or **hotspot** (locations that provide wireless Internet service via a wireless access point). There are several things you can do to protect yourself. Even if your home network is secure, open public networks, while convenient, may leave your computer vulnerable to crackers.

Never engage in something that begs for security, such as online banking, on an open network. (We use our desktop PC, with an Ethernet cable into our wireless router, for this sort of thing.) Avoid even entering credit card information over an open network; any data you send over an unsecured network is not encrypted and is relatively easy pickings for packet sniffing programs. It's one thing to have people snooping at your email password—it's another thing entirely when someone's accessed your bank account or credit card information. And if you're thinking of using a hotspot hosted by an unknown private owner, remember that sniffing the packets that come through his router, over his broadband connection, is also a relatively simple task.

Always install a software firewall such as Zone Labs ZoneAlarm (\$19.95; www.zonelabs.com) or Sygate (\$39.95; www.sygate.com). Both have free versions. The premium versions of ZoneAlarm (\$59.95) and Sygate, along with other commercial packages, such as Norton Internet Security (\$69.95; www.symantec.com), are more full-featured. At the very least, use the freeware versions to protect your laptop against intruders. It shouldn't even bear mention that you should buy an antivirus program, such as Norton AntiVirus (\$49.95), which is a component of Norton Internet Security, or a freeware equivalent, such as Avast Antivirus (www.avast.com), and update

the virus definitions *and* your OS (via Windows Update) on a regular basis.

If Things Don't Work

Before you begin troubleshooting, check the support section of your vendor's Web site and make sure all your

If you want to connect a desktop PC to a wireless network, you can use a USB adapter, a network bridge, or an internal PCI (Peripheral Component Interconnect) card, such as this D-Link DWL-G520.



hardware's firmware is up-to-date. This alone has solved the majority of our connection problems. And if you're using WEP or WPA keys, make sure you've entered the same key on the access point and the network client. Also make sure your access point settings match the rest of your network; if your router is set to 802.11g only, for instance, you won't be able to use 802.11b network clients.

If you appear to be on the network but can't access the Internet, do the obvious and check your broadband connection. DSL and cable network access have both been known to go down. Power down the modem and the router, wait 30 seconds, power the modem back up, and when all proper LED indicators are lit, power up the router again.

If you're having trouble with the service, be prepared to hook up your laptop right to the cable/DSL modem to make sure your Internet connection is live.

If things still don't improve, you can blame Windows XP. Go to Control Panel, Administrative Tools, and Services and find Wireless Zero Configuration. Stop and restart the service. That may get things rolling again. **CE**

BY BERNARD YEE

Beyond The Basics

Share Media Players, Online Games & Videophones Throughout Your House

Now that you have your Wi-Fi network in place, with two, three, or even four PCs working together as a LAN (local-area network) and sharing a single broadband Internet connection, it's time to put it to work in some new and interesting ways. You can make your wireless network as entertaining as it is productive, so why not get started and make the thing pay its way every hour of every day? Here, we'll show you how to make your network part of your home entertainment and video game systems.

Add A Wireless Media Player

What's a wireless media player? The "wireless" part refers to the ability to connect to a Wi-Fi network—that is, connect to the network without physical wires. It's the "media player" portion of the definition that causes the most difficulty. Essentially, a **media player** allows the content of a media server to be played on audio or video devices, such as a stereo or a TV. A **media server**, in turn, stores multimedia files—music, video, photos—and works in conjunction with the media player to play or display those files. With a media server and a media player in place, you can click a button on your remote and make a favorite MP3

file stored on the PC in your study play on your networked audio system. Click another button, and the video of your friend's wedding, also stored on the PC, plays on your network-connected big-screen TV. And so on.

Available from a variety of manufacturers, media players act as adapters for non-networked media devices so that they can connect to your network.

Great idea, obviously, but there's one major problem: Most of us have stereo systems and TVs that obstinately refuse to be connected to our home networks. They lack Ethernet ports or slots for wireless network adapters, so we need another way to connect them to our LANs.

That's where the current breed of wireless media players comes into play. Available from a variety of manufacturers, media players act as adapters for non-networked media devices so that they can connect to your network.

Primary examples include the Linksys Wireless-B Media Adapter (\$179; www.linksys.com), the D-Link MediaLounge DSM-320 Wireless Media Player (\$179; www.dlink.com), and the PRISMIQ Media Player (\$199; www.prismiq.com). All of these products do more or less the same thing, bridging your A/V devices and your wireless LAN. Several variations on these devices also exist, including the upcoming PRISMIQ Media Player/Recorder (\$299), which adds TiVo-like capabilities to the standard device, and the Linksys Wireless-B Music System (\$179), a networked audio player that includes speakers and a radio-like LCD.

For this article, we used the PRISMIQ Media Player. PRISMIQ focuses exclusively on its Media Player line. We've already mentioned the Media Player/Recorder product, and the company also makes available the Media Player Wireless Keyboard (\$49), expressly designed to work with the included MediaManager software.

Installing the Media Player means placing it near your TV and sound system, connecting the RCA audio outputs to the corresponding inputs on your TV or amplifier/receiver, and connecting either the RCA video cable or the S-Video cable to the TV's input jack (of course, you can connect to a data

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Once upon a time, playing video games meant playing them solo or with someone sitting at the console with you. Now, many games have online capabilities, with the PS2 and Xbox, in particular, offering full-featured and well-developed gaming over the Internet.

projector or a PC capture card if you prefer). Also, at the back of the unit, you'll find an Ethernet port and Wi-Fi card slot so you can set up a wired or a wireless system. The Media Player offers compatibility with all three major Wi-Fi protocols (801.11a/b/g), so it should work without any problems with whatever wireless access point you currently use. The unit also features a digital audio output jack (S/PDIF [Sony/Philips Digital Interface Format]) for higher-quality audio capabilities.

For the PRISMIQ to function as a media file sharer, you must install the MediaManager software on the PC (or PCs) on which your media files reside. This software will automatically locate all media files (unless you opt to locate them manually), and you can launch these files on the PC by pressing the appropriate buttons on the included remote control. The remote has buttons for a video screen, audio screen (for music and Internet radio), images screen, and chat screen, with options to play the files in full-screen mode, as well. In addition to playing video files, you can surf the Web on your TV, and the remote provides a rudimentary keyboard for this activity.

The secret to the success of any such product is its compatibility with the PC's maze of file types. The PRISMIQ lets you play video files in AVI (Audio Video Interleave), MPEG-1, -2, and -4 (Moving Picture Experts Group-1, -2, and -4), and Motion JPEG (Motion Joint

Photographic Experts Group) format, as well as MP3, WAV, WMA (Windows Media Audio), and AC3 (Audio Coding 3, synonymous with Dolby Digital) audio files (plus Rhapsody and EMusic services). It will also display GIF (Graphics Interchange Format), PNG (Portable Network Graphics), and JPEG digital photos. Obviously, QuickTime and Windows Media Video users will have to convert files if they wish to use them, so not everything's perfect here. By comparison, the D-Link product handles all of the above.

Add A Game Console

Once upon a time, playing video games meant playing them solo or with someone sitting at the console with you. Now, many games have online capabilities, with the PS2 and Xbox, in particular, offering full-featured and well-developed gaming over the Internet. Xbox ships with a built-in Ethernet port, and Sony sells a Network Adapter for the PS2 (\$39; www.us.playstation.com) that adds an Ethernet

also downright dangerous. Cables are easy to trip over.

You can resolve the cable conundrum, of course, wirelessly. But because neither the PS2 nor the Xbox have wireless capabilities built in, you need a **go-between**—a device that simultaneously connects to your wireless network and provides a wired connection to the console. Several of these are available, with D-Link and Linksys providing two of the most popular. The D-Link DWL-G820 Gaming Adapter (\$89; games.dlink.com) and the Linksys WGA54G Wireless-G Game Adapter (\$99) both offer 802.11g wireless capabilities with compatibility for 802.11b access points. Both companies also offer an older 802.11b gaming adapter for about two-thirds the price. Xbox players should also consider the \$109 Xbox Live Adapter from Microsoft (www.xbox.com).

To get your game console connected to your wireless network, you first need to connect the gaming adapter to the WLAN (wireless local-area network). This means plugging the adapter into a wall socket and configuring it to see the



The Media Lounge Wireless Media Player gives you control over the multimedia files you have on your hard drive, transferring them to your TV.

port (as well as a standard phone jack for dial-up users) to its system. The problem: Ethernet ports require Ethernet cables, and in order to share an Internet connection between your PC and your console, you have to run this cable from the router to the game machine. For most of us, that means from the study into the family room, and not only is this arrangement unsightly, it's

wireless connection. Depending on your adapter, this might mean manually tuning the device using the channel selector button on the adapter, but all game adapters mentioned here will almost certainly work straight out of the box as soon as you power them up and connect them to your console. The only possible snags occur if you have changed the security settings on your access

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point, adding either WEP (Wired Equivalent Privacy) or WPA (Wi-Fi Protected Access) encryption. In that case, you'll need to configure the adapter by accessing its configuration screen through your Web browser (all three products include instructions for doing so). Or, if you prefer, you can deactivate the encryption settings on your access point whenever you want to play a game online. Furthermore, as with all wireless products, if you buy your game adapter from the same company as your access point, there's a good chance it will connect to the network as soon as you power it up. That said, wireless networking products have become far more

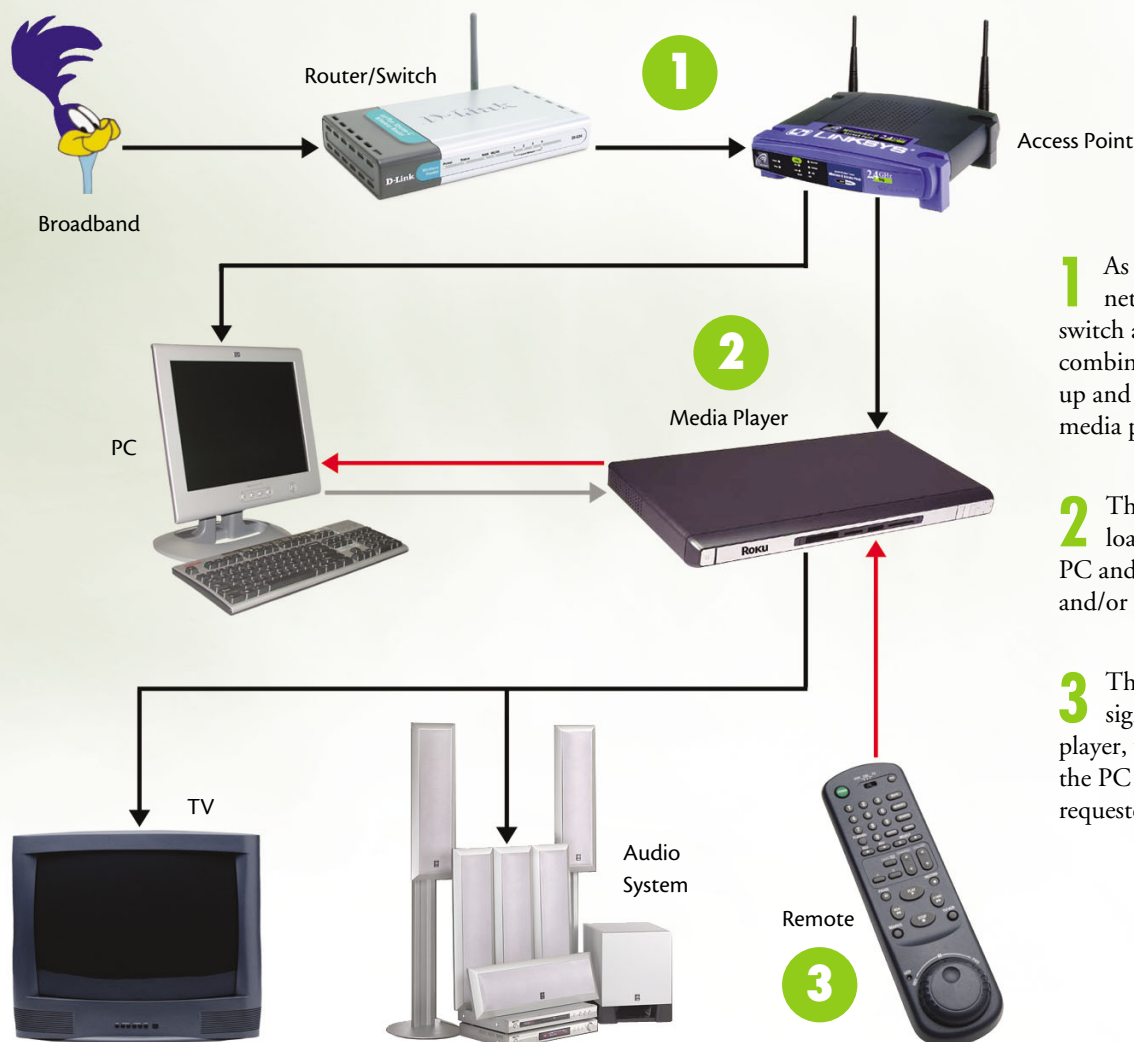
compatible recently, so such a buying strategy is less necessary than it once was. And even if you do buy products from the same manufacturer, if you've altered those factory settings, as you should in order to protect your network, you'll need to provide the same settings to the adapter.

With the game adapter on the network, you can now get your console on the Internet. Run an Ethernet cable from the Ethernet port on the adapter to the Ethernet port on the console and load the console's networking software. If this is your first time on the game network, you'll need to set up an account, but if you've already been using your

console on the Internet and have simply changed from a wired to a wireless setup, the console won't know the difference. As far as it's concerned, it has the same network connection.

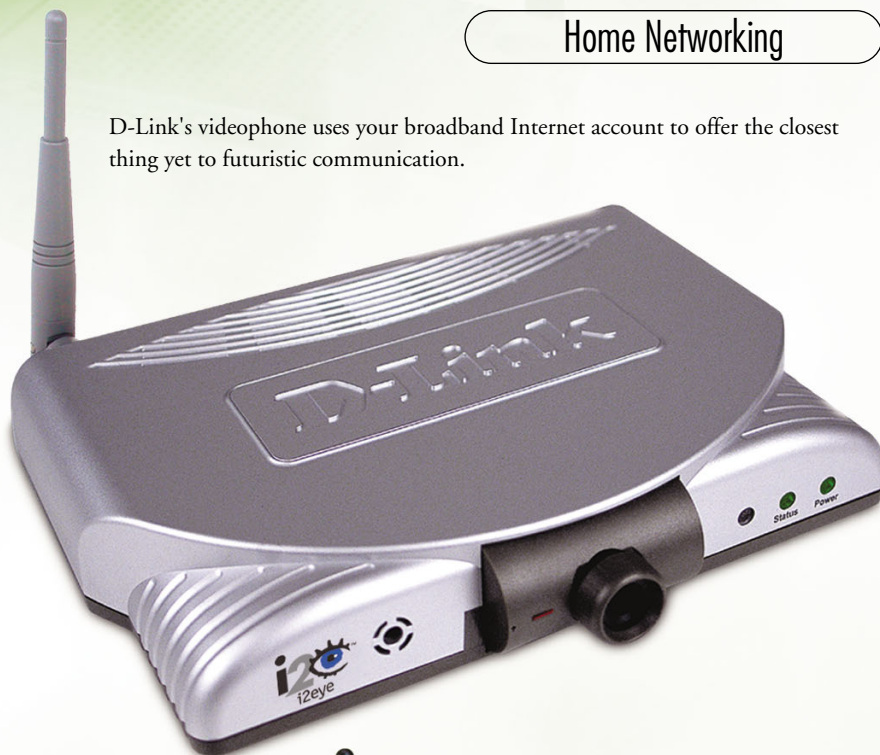
If you've never connected your console to the Internet, you'll need some tools in order to do so. PS2 owners need the PS2 Network Adapter, a hardware unit that slides into the expansion port and provides the necessary Ethernet jack. Xbox owners need the Xbox Live Starter Kit (\$69; www.xbox.com/en-us/live), which provides three months or one year (depending on which kit you buy) of connection to the Xbox Live network. PS2 owners are more fortunate

How To Set Up A Wireless Media Player



Home Networking

D-Link's videophone uses your broadband Internet account to offer the closest thing yet to futuristic communication.



from a price standpoint because connecting to Sony's online gaming network is free.

Add A Videophone System

Most of us think videophones are a neat idea as long as only the person on the other end has transmission capabilities. After all, if we suddenly became visible while on the phone, we'd have to worry about concealing our boredom, scorn, and inattention during the conversation. No more rolling of eyes, no more clicking of mice, no more making funny faces to people in the room overhearing the conversation. And who would ever want to answer a videophone that jars him awake first thing in the morning?

But hey, why not give a videophone a try? D-Link offers just the ticket, the \$249 DVC-1100 Wireless Broadband VideoPhone, which as its name suggests hooks right to your wireless network and provides a camera and microphone to capture your face and voice. You run wires from the DVC-1100 to the input jacks on your TV (or to an RF [radio frequency] modulator if you don't have RCA jacks), use the included remote control to dial IP (Internet Protocol) numbers (instead of phone numbers), and answer incoming calls. Configure

the device on-screen to connect to your wireless LAN, and you're off to the races.

Except, of course, for one important point. To make one of these phone calls, both you and the person you're talking to need a videophone. So don't expect this technology to substitute for your standard POTS (plain old telephone service) anytime soon. It's designed for small teleconferences and for personal uses such as having your children talk with their grandparents or having your teenager hang on the phone for hours while actually looking at the person he's not saying anything to. Think of it as real-time video sharing, and you have the idea.

For best results, D-Link suggests that you connect a standard telephone set to the DVC-1100's phone jack. Doing so lets you use the handset to dial numbers, answer calls, and provide better audio than the built-in microphone. The DVC-1100 also offers a microphone jack for adding an external microphone—a good idea if you don't want to use a handset.

Does it work? Yes, but even with a broadband connection, the video tends to be a bit choppy; however, it's much, much better than using a Web cam with a dial-up connection. We tested this device with one location on a Microsoft-based WLAN and the other on, first, a D-Link-based and, then, Linksys-based WLAN, and it worked flawlessly with all combinations. The largest single usability issue is the same as that with using pretty much any multimedia application over the Internet: If even one of the two PCs connects through a router, the NAT (Network Address Translation) addressing system often makes connecting next to impossible because the DVC-1100 needs a public IP address to connect to, and NAT devices provide private addresses. Add a firewall to the mix, and you have even more connectivity issues. Indeed, if you're running Windows XP, the videophone's installation documents advise you to disable WinXP's built-in firewall in order to use the videophone, and that limits its ultimate usefulness because in these days of constant hacking, disabling a firewall is never a good idea. Nor is WinXP the only problem here; any firewall,

The Linksys Wireless Media Adapter offers 802.11b access to your PC's multimedia files, playing them on your TV or stereo.




such as those built into wireless access points, will usually block Internet access for videophones and other multimedia devices.

Still, with video at 30fps, full-duplex audio, a speed-dial list of up to 50 IP numbers, and a built-in directory service available for contacting other DVC-1100 users, this item offers yet another intriguing way to expand the capabilities of your wireless network.

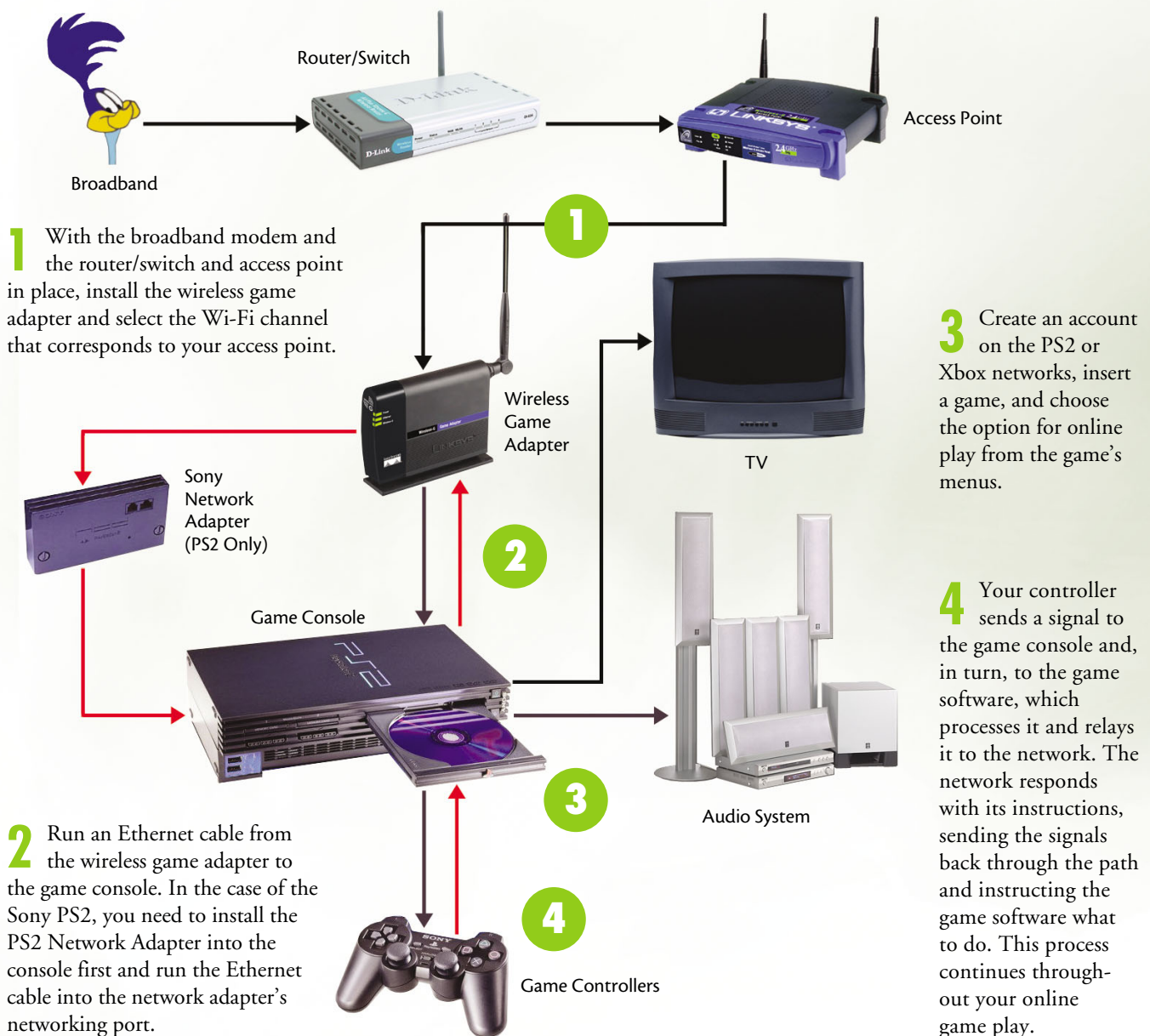
Wireless Everywhere

As soon as you set up your wireless network, it's apparent that the wireless revolution is here. Cordless phones are old news, of course, but cellular phones make up a chunk of this revolution. Add Wi-Fi networks designed solely to let you share files and access the Internet for productivity, and already you have a burgeoning set of uses. But once you start considering

wireless entertainment, the wireless engine mantra kicks into an even higher gear. Suddenly, even standalone entertainment devices become a thing of the past, and your equipment works together to provide entertainment wherever you happen to be. We're still in the early stages of this change in how we live, but the possibilities are becoming clear. 

BY NEIL RANDALL

How To Set Up A Wireless Game Adapter





Susan will make sure you're comfy with your Anthro choice.



Yes, life can be this good. You, your laptop, and a comfy place to work (that's the part Anthro supplies). What more could you need? All Anthro furniture is modular and flexible, so we're delighted to help find the right fit for you. Tell us about your furniture challenges and we'll configure choices for you to consider. (Did we mention our Lifetime Warranty?) Contact our helpful folks at Anthro.com or 800-325-3841.



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What A Wireless World This Could Be

Devices To Help You On Your Wireless Way

Apple AirPort Express

\$129 • www.apple.com

Leave it to the engineers at Apple to take a utilitarian 802.11g wireless access point and make it cool. Not only is the AirPort Express a Lilliputian-sized access point, but it also works as a wireless print server *and* music server via a sibling of the iTunes utility known as AirTunes. The AirPort Express is also platform friendly, working effortlessly with both Macs and PCs. Combine this with the ease of use Apple is known for, and you have a recipe for home-networking success.

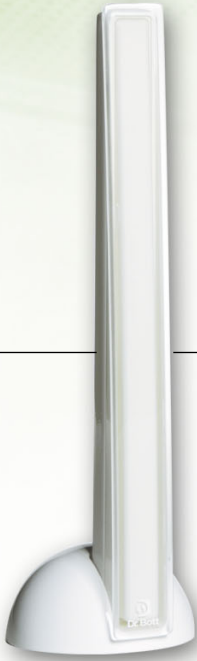
Apple AirPort Extreme

\$199 • www.apple.com

Who says geek gear has to look nerdy? With Apple's AirPort Extreme base station, you can have your high-speed connection and good styling to match. With 802.11g circuitry, the AirPort Extreme will power your wireless network at speeds of up to 54Mbps (megabits per second). It even includes a modem so you can dial into your home network while on the road. And if you're concerned about wireless security, Apple has you covered with WPA (Wi-Fi Protected Access) that locks your network down, tight as a drum.



Home Networking



Dr. Bott ExtendAIR Antenna Omni

\$99.95 • www.dr bott.com

Wireless dead spots are a fact of life for many consumers. Whether it's caused by poor placement of your access point or obstructions that block and attenuate your signal, increasing the range of your WLAN (wireless local-area network) is the goal of the ExtendAIR Antenna Omni. Designed for use with Apple's AirPort Extreme base station, simply plug the ExtendAIR into the AirPort's antenna port, and you'll improve the reception on your wireless network up to 50%.



D-Link DCS-5300W Wireless Internet Camera

\$449 • www.dlink.com

Need to remotely monitor an office or garage? Install D-Link's DCS-5300W, and you can watch and listen to high-quality sound and video over the Internet. With the DCS-5300W, you can pan and tilt the camera with either a remote control or your Web browser. If you want to use it as a security camera, its built-in motion detector can trigger an email notification.



HP JetDirect 380x Wireless Print Server

\$239 • www.hp.com

Need to share a printer on your wireless network? Look no further than HP's JetDirect 380x. Designed to work with HP's USB networked printers, the 380x utilizes the 802.11b technology in conjunction with HP's JetAdmin printer management software. Not using Windows as your OS? Not to worry, as the 380x is compatible with Mac, Netware, and Linux, as well as Microsoft Windows.



Linksys WPS54GU2 Wireless-G PrintServer

\$235 • www.linksys.com

Whether your printer uses a parallel connection or USB 2.0 port, the PrintServer from Linksys can convert it into a Wi-Fi (802.11g) printer the entire house can use. With a 3MB print buffer and 54Mbps transfer rate, the PrintServer lets you put your printers wherever needed without criss-crossing your house with network cables. The PrintServer can manage two printers simultaneously and doesn't require a dedicated PC to control the printer.

Home Networking

Linksys WGA54G Wireless-G Game Adapter

\$109.99 • www.linksys.com

The latest craze in console games is online multiplayer gaming. Yet running Ethernet cables from your computer to your TV room isn't always feasible. Here's where Linksys's WGA54G steps in. Simply connect the Wireless-G Game Adapter to your game console and let it connect through your 802.11g wireless network. With speeds up to 54Mbps, you'll be fragging online with no strings attached.



Linksys WAP54G Wireless-G Access Point

\$99.99 • www.linksys.com

Consumers looking to add wireless connectivity to their home networks will find the WAP54G from Linksys a perfect fit. With support for 256-bit WPA and transfer rates of up to 54Mbps, the WAP54G is a hassle-free way of joining the wireless world. The WAP54G also supports the Linksys Wireless Guard service for the ultimate in wireless security.



Marware WiFi Spy

\$29.95 • www.marware.com

Having trouble locating a Wi-Fi hotspot while traveling? Marware's WiFi Spy can help you track down a wireless connection. The keychain-sized device is simple to use; press the button, and if an 802.11b/g connection is available, a signal strength meter lights up.



Netgear WG111 Wireless USB 2.0 Adapter

\$82.59 • www.netgear.com

Even in today's Wi-Fi world, there are many PCs and notebooks that don't have wireless adapters. And for notebook users, size matters almost as much as performance. Netgear's WG111 packs 802.11g's 54Mbps transfer rate into an adapter that can fit comfortably in your pocket. Simply plug the WG111 into your PC's USB 2.0 slot, and you're ready for wireless Internet access.



Home Networking



Pacific Digital MemoryFrame Wireless Edition

\$499.99 • www.pacificdigital.com

Tired of viewing your digital photograph collection on your PC? Use the MemoryFrame to display them in your living room. A unique combination of LCD and wood frame, the MemoryFrame can display up to 80 images transferred over an 802.11b Wi-Fi network. It also includes stereo speakers so you can add a narration to your slide show.



Philips iPronto TSi6400

\$1,699 • www.philips.com

If you're a home theater junkie who also can't stay away from the Internet, the iPronto serves both purposes. With a design that's right out of the latest "Star Wars" movie, the iPronto uses an 802.11b connection that lets you channel surf and Web surf at the same time. When you're not checking out your favorite Web sites, the iPronto can control all your home entertainment devices from the comfort of your sofa.



Slim Devices Squeezebox

\$199 • www.slimdevices.com

The music server with the funny name is no laughing matter. The Squeezebox is a serious, well-thought-out music server that is at home with both wireless and wired networks. With an easy-to-read LCD, navigating your music playlists via the remote control or your computer's Web browser is a snap. With both digital and RCA (analog) outputs, the Squeezebox delivers your music in pristine condition to your home audio system.



Yamaha MusicCAST

\$2,800 • www.yamaha.com

The MusicCAST system aims to bring wireless audio to consumers more comfortable with high-end audio gear than with a PC. With Yamaha's client/server system, this is as easy as inserting a CD into the MCX-1000 server and waiting until it's ripped to MP3. Once you've loaded the MCX-1000 with your audio collection, playback over an 802.11b network to MCX-A10 clients is simple through an elegant LCD. With support for five clients playing individual music playlists, the MusicCAST can keep everyone in the family happy.



Out Of The Box

Get Rolling With Your MiniDV Camcorder

There are two kinds of people in the world: Those who willingly read the manuals that come with their new gadgets, and those who'd rather take a few jolts from a cattle prod.

Pity the poor bovine surrogate, then, with a brand-new digital camcorder. Compared to older analog tape models, digital cameras have a ton of features that aren't always obvious at a glance, resulting in a manual that some may find dauntingly thick.

We still recommend reading it, of course, but you don't have to devour the whole thing to start rolling tape. We'll cover the basics so you can jump to the gratification stage as quickly as possible and learn the rest at your own pace. For illustration, we'll be using Panasonic's PV-GS200 (\$999.95; www.panasonic.com), but many tips will apply to most models.

Three Is Better Than One

The Panasonic PV-GS200 records to MiniDV cassettes, and in overall design it looks virtually identical to most other MiniDV units on the market: Its compact body, built-in hand strap, and cluster of controls enable one-handed operation, and on the left side, a rotating panel flips outward to reveal an LCD screen that doubles as a viewfinder and operational menu display.



Under the hood, though, the PV-GS200 has one huge difference. In contrast to just about all other models in its size and price classes, it's a 3-CCD camcorder, rather than a 1-CCD model.

What's the difference? **CCD** is short for charge-coupled device, referring to the camera's image sensor. In a 1-CCD camera, a single sensor processes the entire image. A 3-CCD camera has three sensors, one for each color composing the video signal: red, blue, and green.

In "CE Face Off" in the September issue of *CE Tips*, we compared five 1-CCD camcorders, and image quality was comparable all around; differences were negligible to nonexistent. The PV-GS200 is another story. Image

sharpness is equivalent, but the color saturation is noticeably richer, particularly when shooting outdoors in natural lighting.

3-CCD cameras have been around for years, but you had to be pretty serious about videotaping to shoulder the camera's cost (often upward of \$2,000) and size (more like a professional TV camera). With the PV-GS200 and its little brother, the PV-GS120 (\$699.95), Panasonic kicked the doors wide open on what it's possible to pack into a compact digital camcorder that doesn't break your budget. Since their release early this year, Panasonic has further expanded the line with the PV-GS400 (\$1,499.95).

Gear Check

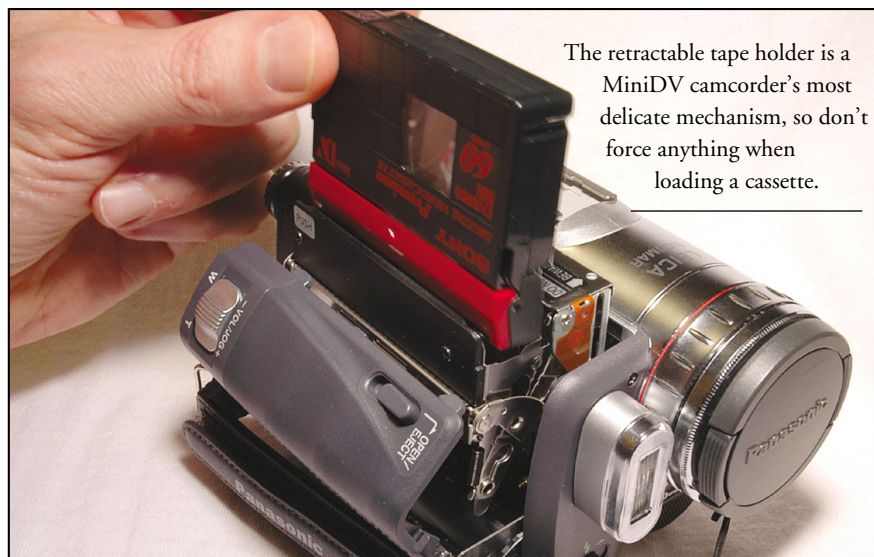
These days, camcorders come with enough trinkets that opening the one box is still a bit like Christmas morning. Accessories typically include a Li-Ion (lithium-ion) battery and charger, the lens cap, a shoulder strap, a remote control for recording and playback, an analog A/V cable (composite video and left/right audio) to plug in to your TV or recording deck, a USB

cable for plugging in to your computer, and software so you can capture and edit video and still photos.

That's right—most camcorders shoot photographs, too. So if your camera's manufacturer is feeling generous, you may find a memory card included, as well.

If you're still shopping and haven't made up your mind, be on the lookout for any distinctive accessories a camcorder may include that could factor into the shooting habits you foresee.

The PV-GS200 includes a unique second remote control called the Magic Wire, a skinny, little wired remote that not only has Record and Wide/Telephoto buttons but also



The retractable tape holder is a MiniDV camcorder's most delicate mechanism, so don't force anything when loading a cassette.

incorporates a microphone (thus it has a lapel clip). When plugged in, this mic overrides the camera's built-in stereo microphone, so you can do tricks such as recording narration or using it in an interview setting. The cable length is only a bit over 3 feet, though, so interviews may have, ahem, an intimate proximity.

Because a camcorder has so many accessories, check immediately that the box contains everything it's supposed to. The manual should list all the accessories, so it will be easy to tell if you've been accidentally shorted.

One notable lack: Even though most digital camcorders have a high-speed IEEE-1394 jack (also known as FireWire and i.Link) for transferring video into a computer, we've yet to see a unit cross our desk that includes this type of cable among its accessories.

Not So Fast, Pal

Naturally, you're eager to start shooting. However, Li-Ion batteries are usually empty-on-arrival. You'll need to juice up before you can power on.

Many camcorders can charge the battery only while it's attached to the camera. The PV-GS200 isn't one of them. And we prefer its use of a charger unit that the battery alone plugs into, for a couple of reasons. It's more convenient than parking the entire camera

beside the wall socket and doesn't take the cam out of commission if you have a second battery. Also, this sort of design frequently comes with an adapter plate that plugs into the camera's battery socket, letting you run it off wall current. With the combined lengths of the charger and adapter cables, the PV-GS200 provides nearly 13 feet of range. That should be sufficient to keep you filming indefinitely within the same room.

Sure, camcorders without such adapters will let you run them from the charger, as well. But there's an important difference: With the adapter, you're not exposing the battery to electrical current it doesn't need. Li-Ion batteries are enormously convenient for their rechargeable nature but, unfortunately, will not live forever. Still, you can extend your battery's life as long as possible by charging it fully, draining it dry (typically between two and two and a half hours of use), and only then recharging it—recharging it when it's still at half-capacity shortens lifespan.

So hook up, plug in, and start charging. The battery included with the PV-GS200 takes around two hours and 45 minutes to go from inert to fully charged. Be mindful of the time, too, so you can remove the battery as soon as it's charged instead of leaving it needlessly plugged in to the charger. All chargers let you know when the

battery is ready. With the Panasonic, the green status light winks off when charging is complete.

Meanwhile, use the waiting period to take care of the other little tasks you shouldn't put off. You should definitely attach the lens cap; on most models its tether loops onto the foremost section of the hand strap built into the camera's right side. The shoulder strap will provide another level of protection, particularly if you're going to be moving around a lot while shooting. For the Panasonic, undo the strap tips from their fasteners, feed them into the loops on either side of the camera's back end, and then secure them once again through the fasteners. "Shoulder strap" is a misnomer, though. It's short and thin enough that you'll probably want to hang the camera from your neck. It just feels more secure that way.

Preliminary Setup

As we mentioned earlier, the PV-GS200 records to MiniDV cassette tapes, and most MiniDV models load tapes from the bottom. Fortunately, the PV-GS200 is a top-loader, instead. If you're in a lengthy shoot that requires multiple tapes and you're using a tripod, you'll be grateful for this design. With a bottom-loader, you must remove the camera from the tripod and take off its quick-release plate each time you want to swap tapes, which is not only cumbersome but also shuts down filming for a minute or two. With a top-loader, you merely eject and reload.

(You may want to use a tripod with the PV-GS200 whenever it's feasible. The unit's image stabilizer—a component that smoothes out minor shakiness during normal handheld use—isn't as effective as some we've seen. The image can be comparatively jittery, especially when using the Telephoto.)

To load a tape, the camera needs power, but it doesn't necessarily have to be on first. Just flip forward the Open/Eject lever atop the gray housing

and tilt the housing outward. The cassette holder will rise out of the camera body, with a panel opening to admit the tape. Insert the tape (make sure you orient it properly, with the window-side out and the cassette's guide arrow pointing into the camera). Close the cassette holder (look for the marker telling you where and where not to push), and it will automatically retract. Then, close the main housing.

Now you're ready to power on. Remove the lens cap first, though; otherwise, the Automatic White Balance, which analyzes your source light for the purposes of color accuracy, may not work properly. Also, flip open the left-side panel to reveal the 2.5-inch LCD. This screen displays the lens' view or a playback of what you've already shot, as well as the camera's menu and data pertinent to filming.

The first time you turn on the camcorder (depress the tiny blue release button on the On/Off switch), it'll prompt you to set the date and time. This will give you a good feel for using the main control for menu navigation and selection. The PV-GS200 has a circular, multipurpose, four-way pad with an Enter button in the middle, located in the recessed area behind the closed LCD. Navigating the menu and adjusting the settings are intuitive: Move horizontally with the Left/Right arrows and vertically with the Pause and Stop symbols.

In The Mode

As long as you understand a few primary controls and settings, you'll have a handle on most shooting situations. It

mainly comes down to which mode the camera is in.

Operation modes. Above the On/Off switch is the Mode Dial, with six color-coded icons that ready the camera for a particular activity. (Some camcorders list their modes directly on the On/Off switch.) Red is for recording functions and green for playback. The four icons grouped around the SD designation are for using the memory card.

To record to tape, rotate the red camera icon to the white mode marker, and you're ready to roll. Press the red-dotted Record button on the On/Off switch; the LCD will momentarily flash RECORD in confirmation. To stop, press the button again, which puts the camera into Pause.

Shooting modes. By default, the camcorder automatically adjusts to changes in your shooting environment: lighting, subject movement, etc. Sometimes, however, you may tape under specific conditions in which it might help to use a mode intended just for these circumstances.

To access the programmed modes, press the Menu button and then navigate directly left to right: from Camera to Prog AE to Off. Below Off are five shooting modes designated by icons. In order:

Sports optimizes the camera for fast-moving subjects. Portrait keeps the focus on the foreground subject by slightly blurring the background. Low Light improves visibility in a dark environment. Spotlight helps track a performer under a spotlight. And Surf & Snow prevents underexposure in a highly reflective environment.


Quick Tips

A few pointers can help improve even your earliest shots.

- Depending on your subject's appearance, you may want to engage the Soft Skin feature, just above the round control pad. It can make lines and other imperfections less apparent.
- If your subject is backlit and difficult to see, press the Back Light button (beside the LCD panel's hinge) to brighten her a bit.
- Use the zoom judiciously. Remember, pointless zoom-ins and -outs are a staple of "Wayne's World" and primordial music videos.
- If something gives the Auto-Focus trouble, change to manual with the switch on the cassette housing and then adjust the lens ring as needed.

Playback. No doubt you'll want to view your tape on a screen larger than 2.5 inches. To connect the camera to your TV, open the little door located in front of the On/Off Switch and Mode Dial. Plug the included A/V cable into the bottom A/V Out jack and connect its color-coded plugs into the appropriate A/V inputs on your television.

Rotate the camera's Mode Dial to the green playback icon. The circular pad you used for setting the date and time and navigating the menu now operates much the same as your VCR's controls, with the Play button in the center and the Rewind, Fast-Forward, Pause, and Stop commands around the edge.

All of this is just a basic foundation, of course. There's much more to learn—special effects, fine-tuning the display, overdubbing audio, and a whole raft of other possibilities. But that's what the manual is for. You didn't think you could duck it forever, did you? 

BY BRIAN HODGE

Digital camcorders come with so many accessories that you may find using them is easier than keeping track of them all.





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Your Fortune On Film

Video Inventorying For Insurance

Video cameras have become a familiar site in American households. We use them to record everything from weddings to vacations, from birthdays to births. Few people, though, recognize the value video cams provide in documenting household goods for insurance purposes. By itself, a video inventory isn't sufficient to substantiate all claims of loss, but it's one of your strongest weapons in proving those claims with any insurance company. "The recent firestorms in California last year and in Oakland back in 1991 under-score the need for video inventories," says Randy Goodman, executive vice president of Goodman-Gable-Gould/Adjusters International. "Following those losses, there not only wasn't any personal property, there were no buildings to determine insurable value. We found a video record was often critical in demonstrating what was present prior to the physical event."

But you can't just casually film your house and expect insurance companies to take the results seriously as proof of ownership and value. Their money—and yours—is riding on this evidence you present. Like playing Mozart on the piano, it's easy to make a video inventory of all your goods. It's just very tough to do it right.

In this feature, we're going to tell you how it's done. We've also spoken to some of the experts in the field who have worked with hundreds of video inventories and have their own tips to offer.



Video Preparations

You can use any video cam to make a video inventory, but there are several factors to keep in mind concerning the mechanical act of filming. First, provide an artificial source of light. "People don't always augment their lighting while doing a video inventory. We've seen bad examples where we think it's a TV in the corner but really can't tell," says Kip Diggs, spokesperson for State Farm Insurance. "If you can open the drapes and have enough light to clearly identify all items and every serial number, you can probably get away with natural lighting. But otherwise, indoors, I'd recommend an alternate light source."

A good light source would be the kind that distributes light evenly

across the entire room, leaving everything bright and nothing in shadow. Atmosphere isn't important; clarity is. You should also try to prevent glare. Use nonglare surfaces rather than reflective glass, plastic, or metal to act as a backdrop for smaller items.

One important add-on that Diggs suggests for all video inventorying is a tripod. "I've seen videos where your inner ear goes crazy," says Diggs. "Establishing shots and close-ups aren't solid, and there's movement, everywhere." The kind of ciné vérité filming techniques where a moving camera furnishes a sense of life and activity are completely out of place in a video inventory.

So is that spotless, unlived-in showplace feeling that you get from the pages of *Better Homes and Gardens*. Quite the opposite: You want clutter, but *organized* clutter. Display everything that you would want replaced in case of loss and expose it all in such a way that you can zoom in and confirm your ownership. Think of what an insurance company would want to see as you prepare to make the video. Let that guide the way you set up the room and the time you spend viewing each item. What kind of detail would the company expect? On what would your agent's eyes linger, searching for proof that your speaker system was made by Harmon Kardon and that every CD and DVD you claim was actually in your possession?

Create A Game Plan For Your Film

Remember, you're making a catalog, not a tour. Tours try to include a sense of free form spontaneity to keep interest, but



Including smaller valuable objects in the entire frame makes them easier to identify.

insurance adjusters aren't at risk of being bored. Catalogs display data in a strict format for ease of access. You can make your video inventory a lot more intelligible for adjusters and insurance companies if you create a planned approach to each room and stick with it as you go through your house.

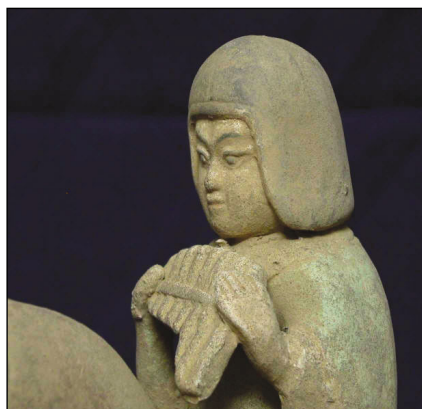
Leslie Knox, president of Andrew K. Knox and Company, insurance adjusters, suggests a strategic plan that moves from the general to the specific. "Begin with a view of the entire room. Then show the walls, ceiling, and floor. Focus on any special molding or other additions. Then



First, you'll want to do an establishing, full shot of each art object.

Close-Ups

Everything you'd want to recover in case of loss is worth documenting visually for insurance purposes. But according to the adjusters we interviewed, goods worth a couple of hundred dollars or more deserve detailed close-ups. Several went so far as to say that if an item might appreciate in value in the future, it should be videotaped in detail now, even if its current worth is low. (An example might be a new series of commemorative plates or a numbered lithograph from an unknown artist.)



Then, move in on art objects for close-ups that show details.

move on to windows and window treatments, followed by large furnishings, and then items on top of those furnishings. Only then, move to smaller furnishings and look inside drawers. This way, everything is properly linked together. I can show the wall, then move to the sofa, and tell an insurance company, 'Look, here's this wall, and on it we had an 80-inch sofa.' A slow, determined, quantitative method that repeats for each room is much easier on us."

One other useful tip we've gleaned during conversations with adjusters is to begin your video with a master shot of the complete house and then a walk through the front door and into the first room you're inventorying—with a family member (briefly) present. As Knox points out, the idea is to establish links between your house, the rooms you're filming, and personal ownership of it all.

Videos have two great advantages over still photos. First, they offer depth-of-image. Second, continuous filming that moves from general shots into details of labels, brands, pattern names, and serial numbers can prevent accusations of "this close-up photo of a high-end label does not appear to match this distant photo of the complete formal dress." These are important factors to keep in mind when filming your detailed close-ups.

Begin with an establishing shot that captures the entire object and then zoom in. When possible, start with an image

that emphasizes all three dimensions. Show an object mostly from the front but angled sufficiently to catch one side and show it horizontally but angled sufficiently to catch the top. Hold this image and all other important shots, such as the backs of electronic equipment, for at least 10 to 15 seconds.

"One important thing you want to include at this point, especially with valuable collectibles, is a ruler inside the frame to prove dimensions. You don't want to leave insurance companies with any questions," says Dick Burr, director of claims and executive adjuster for the Young Adjustment Company. "And if you have two identical copies of any valuable item, take shots of them together in the same frame to prove you have more than one. Sometimes insurance companies are very skeptical of claims for two of anything since the same object can be filmed twice."

As you move in closer, highlight details of the item. Show damage, by all means. Should an item be stolen, that damage may be the best way to prove your ownership if the police recover it. "When you're dealing with name pieces, show those names," says Burr. "For instance, while filming, turn over a Hummel and move in tight to show the manufacturer on the bottom. Do it with serial numbers and any other identifying marks on valuables, too."

Remember that text takes longer to mentally process than visual images. You'll want to linger over the fronts and

backs of electronic goods, clothing, etc., for at least 10 seconds per image, but plan on more footage when the objects require any reading. This holds especially true for shelves with books, VHS tapes, CD or DVD titles, and collections of stamps, cards, coins, etc. Pan slowly through these items. You not only have to show that



A good establishing shot brings out the 3D quality of an object.

you own a collection, but you also have to show each piece in that collection.

Supplementary Materials

"Video inventory is the cream of documentation for an insurance claim," says Tom Moss, president of Tenco Services and current president of the National Association of Independent Insurance



Open a jacket and zoom in for a close-up of the brand as proof of quality.

Adjusters. "But you don't want to neglect other forms of documentation. Everything helps."

Moss says that foremost among these other forms is an audio accompaniment to your videotape. "Video without audio is preferable to nothing at all, but what camera nowadays doesn't have audio?" However, if yours doesn't, buy a portable DVD or MP3 recorder and use that. The quality of the sound isn't important, just as long as your comments are distinct. "This 14-karat gold necklace with eight amethysts was a gift from Aunt Harriet, and she had it appraised. We kept a copy of that appraisal" is just the kind of accompanying verbal documentation that an adjuster likes to hear. It helps define the item (the video shows violet gems; your remarks state they're amethysts) and refers to written materials that help substantiate the claim and value. According to Burr, "Even as simple a statement as saying your silverware is an Oneida serving for 12, will supply verbal, as well as video, proof of your claim.

"Still, you'll want some written evidence, as well," says Burr. Written material is vital, especially for big tag items. Keep copies of receipts and other proof

of ownership. If you lack receipts for electronic gear, save the instruction booklets. Document home improvements made by professionals through invoices. Get written appraisals listing the individual and total contents and value of collections. And, of course, videotape each page.

If you're wondering whether you'll need a new filing cabinet for all your written documentation, Knox counsels against despair. "As a general rule, you're not expected to have more than the adjuster would have in the same set of circumstances. Insurance companies wouldn't expect you to keep receipts for your underwear purchases, for instance," says Knox.

Be Sneaky

You've painstakingly videotaped and prepared a written inventory of your expensive goods. That will help where loss due to disasters is concerned, but what about theft? If your items are stolen, you'll probably want them back even more than you want them replaced.

Recoveries of stolen merchandise occur all the time. Items show up regularly in pawnshops and police raids. The problem confronting owners seeking to reclaim these items is that of offering incontestable proof. Thieves go out of their ways to remove clothing tags and deface serial numbers on electronic gear. It's all in a day's work for them: They render merchandise anonymous, thus keeping themselves (and their customers) out of prison.

But no one says you're stuck with only obvious methods of item identification. Be sneaky and inventive. Find additional ways of proving ownership and document these with your video cam. For example, use a sharp knife to scratch a second serial number of your own devising on the bottom of an expensive piece of electronic equipment. It will probably get defaced, too, if it's stolen—but if the item is recovered and you included thorough coverage of it in your video inventory, the size, shape, and placement of the

scratched-out number will help establish your claim.

Similarly, it's easy to snip tags out of stolen designer clothing. To counter, create very small, personalized tags and sew them inside coat and dress seams where they're virtually invisible. This may seem like a lot of effort, but a high-end wardrobe is worth it if you've any hope of recovery. "We actually had one claim where the clothing alone was assessed at a worth of \$1 million," says Burr. Once again, document your efforts on video.


Timely Videos

Now you know the basics of making a video inventory of your home and its contents for insurance purposes. You also know that these inventories are complex and time-consuming. So the question arises, how often do you need to make a really exhaustive one that covers everything you own?

"Ten years is too long," says Tom Moss. "Update the inventory no longer than every five years, and even two to three years is a good routine. This will help ward off being called on the age of your inventory as unrepresentative." Don't try to take the easy route, either, of using an older video inventory with updates including newer items. Insurance companies are suspicious of any sharp change of locale or date during filming. Set aside a block of time and do it right.

One final thought: Never, ever keep any of your inventory documentation in your home. This seems laughably obvious, but homeowners and businesspeople continue to tell adjusters about their inventories that perished with everything else of value. "We even had a computer company that took digital pictures of its premises and left them at work on one of many computers that went up in flames," says Diggs.

Goodman says, "Keep the original in a safe deposit box and duplicates in relatives' or friends' homes."

In short, take care of your insurance inventory, and it will take care of you. 

BY BARRY BRENESAL

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Portable Video Players

Carry TV Shows & Movies With You

Imagine owning a 10-ounce device, only slightly larger than the average MP3 player, that lets you record and then watch TV shows and movies wherever you are. That's the promise of PVPs (portable video players), an emerging category of CE devices. In addition to playing back video, they also function as MP3 players, and they have features for recording video and audio, backing up your computer data, listening to the radio, and displaying your photos. The best news? Several new models from big-name manufacturers are hitting the market in the coming months.

All of these units are equipped with at least a 3.5-inch LCD for portable viewing. You can also plug them into a TV or video projector. In addition, PVPs act as digital video recorders, recording and storing TV and movie content on their internal hard drives. Most models record at least 80 hours of video, and some go as high as 400 hours. If you store MP3s, photos, and other data on them, you obviously decrease the available space for video. This still packs some serious power for the traveling gadget warrior, though, with the ability to store several thousand songs and 30 or 40 hours of video on the same drive.

Perhaps the greatest thing about these devices is that, in theory, you would no longer have to carry stacks of DVDs with you when traveling. Many of the portable DVD players have larger screens (7 inches and greater), but they are considerably heftier devices—and you have to change DVDs whenever you want to watch something different. In addition, some portable video players act as actual recorders and can play back any MPEG (Moving Picture Experts Group) video transferred from your computer, as well. They're also more convenient to use

than opening a laptop to watch a show you recorded.

Most of the things you would normally do with your VCR or DVR (record television shows, watch home videos, and so on) you can do with a portable video player. Watching actual movies is a bit trickier, however, because you can't copy standard DVDs onto the PVPs because DVD movies are encrypted to prevent pirating copies. As of this writing, there is no standardized way to buy or download video content as there is for music. That is changing quickly, however. Several companies have launched early models for pay-per-view and downloaded movies, and more will soon follow their lead.

Take The Movie With You

CinemaNow (www.cinemanow.com) lets you watch movies with your Media Center-compatible PVP. You can rent movies for \$2.99 to \$3.99 and download them to your player. At press time, there are approximately 500 movies from which to choose. We expect to see more services like this available soon because these services let you watch highly desirable movies as soon as they are available to the home rental market.

In addition, Microsoft announced a licensing deal with MLB Advanced Media (www.mlb.com) for Major League Baseball content. It includes highlights, bloopers, classic moments, and even full games, available on either a subscription (\$19.95 per month or \$49.95 per season) or pay-per-view basis (\$3.95 per game, though this method could get expensive quickly). Microsoft and Disney also announced a multiyear agreement that, while short



on specifics, promises to improve the quality and security of delivering digital content on different kinds of devices. As a result, expect to see Disney movies and TV shows available soon.

Many of the portable video players covered in this article run the Microsoft Portable Media Center OS. Microsoft developed the OS with its Windows XP Media Center OS as a way to standardize the feature set and user interface of PVPs.

Other manufacturers, such as Archos, have decided to go it alone and develop their own OSes. It is too soon to tell which OS will become the most dominant or if there's even room in the market for competing systems. Although it's usually good for consumers to have choices, multiple OSes could lead to movies being released in different formats, cross-platform incompatibility, and higher prices.

So, what's the catch with portable video players? Mainly it's about getting content onto the devices in the first place. Aside from the Archos AV400, none of these first-generation portable video players offer a simple and direct method for transferring content. They require several intermediary steps, such as using your WinXP PC as a way station and scheduler and requiring you to "transcode" the content specifically for the player before you can watch it.

This also means that you have to set up your PC with the appropriate software or, at the very least, use your PC to schedule TV recordings online and then download the schedule to your player. This is certainly possible, but it's an extra layer of complication and cost that the average user wouldn't want to put up with.

Finally, we have some reservations about the size of the screen. Unlike the interfaces for, say, a music player, you need to pay attention to these screens, and at 3.5 to 3.8 inches, they are smaller than the 7 to 10-inch LCD panels that are standard on portable DVD players. The form factor is smaller to match, but reading spec boxes for baseball games is certainly out, and, in general, the screen size might be difficult to view for some people.

Nevertheless, the potential for portable video players is enormous. Let's take a look at the first-generation models and see if they can do for video what MP3 players have done for music.

Many of the first-generation portable video players, such as the Creative Zen Portable Media Center pictured here, resemble handheld game machines.



internal hard drives, respectively. The removable battery is reported to last 4.5 hours when watching video, and depending on the size of the model's hard drive, you can store anywhere between 40 and 200 full-length movies.

The Archos AV400 docks with its own cradle that connects to your TV set and runs its own Archos-developed OS. It records video according to the built-in scheduler and can also synchronize with the My Yahoo! TV Guide. It then

to DVD quality, with a screen resolution of 704 x 480 at 30fps. It records directly from your TV at a slightly lower 512 x 480 resolution but maintains 30fps. Sound playback is via MP3 or compressed ADPCM (Adaptive Differential Pulse Code Modulation), similar to what you'd hear through a Sony PlayStation 2 or Microsoft Xbox.

In addition, the AV400 is a photo viewer, as well as a USB 2.0 backup drive for your computer. With an optional accessory called the FM Radio & Remote Control (price unavailable at press time), it becomes an FM radio with MP3 recording capabilities and a voice recorder so you can take notes or record lectures.

Some of the Archos AV400's additional features include video editing directly on the device, thumbnail views for photos, custom wallpaper for the screen background, and even a video bookmarking feature for remembering where you left off when watching your favorite TV show.



The Archos AV400, available now, is one of several new portable video players hitting the market in the next few months.

Archos AV400 Pocket Video Recorder

\$549

www.archos.com

There are two basic models of the Archos AV400 series Pocket Video Recorder: the AV420 (\$549) and AV480 (\$799), which sport 20GB and 80GB

controls the tuner in your VCR or cable/satellite receiver to record programs on the appropriate channel and at the correct date and time.

Like all first-generation devices, you can watch content on the AV400's built-in screen or on an external TV set. It displays MPEG-4 video, which is comparable

Creative Zen Portable Media Center

\$499

www.creative.com

Like the Archos AV400, the Creative Zen Portable Media Center is billed as an easy way to record TV and movie content and watch it wherever you go. Unlike the AV400, however, the Creative Zen PMC is based on the Microsoft Portable Media Center OS.

The Creative Zen Portable Media Center has a 3.8-inch LCD. It's housed in glossy black casing with easy-to-use

thumb controls on both sides of the unit. The unit's Li-Ion (lithium-ion) battery is removable, so you can keep a spare on hand for extended viewing and toss the original when it wears out and will no longer take a charge.

Based on Microsoft's Media Center OS, the Zen Portable Media Center promises easy navigation due to its familiarity. In addition, the aforementioned licensing deals with CinemaNow, Major League Baseball and Disney are an indication of the level of compatibility you'll get when you buy one of these players.

Still, it remains to be seen if the steep prices for pay-per-view content are enough to sway buyers. To us, it seems that TV and home movies will make up the bulk of content viewing until there is a download model that offers more value. And because you can't record directly from a TV to the device the way you can with an AV400, getting content onto the Zen Portable Media Center is tricky.

Sony HMP-A1 Hard Disk Multiplayer

\$699

www.dynamism.com



The Sony HMP-A1 is Sony's entry in the portable video player market. You can flip it for right-handed or left-handed use.

Sony invented the portable music player with the introduction of the Walkman in 1979 and has developed a reputation over the years for stylish, high-quality electronics. This heritage is evident in the new HMP-A1, Sony's entry into the PVP category. Unfortunately, for us here

in the states, "Sony has no plans to release the HMP-A1 stateside at this time," says Atsuo Omagari, in Sony Electronics corporate communications. Still, it is worth a look, if only for the drool factor.

The 20GB HMP-A1 sports a 3.5-inch LCD TFT (thin film transistor) similar to the other models in this roundup. It departs from the crowd with its sleek silver and black housing. The HMP-A1 can be flipped between right-hand and left-hand mode, and it comes with a remote control and carrying case. The vertical slide control in the middle is touch-sensitive (similar to the circular wheel on the iPod).

The unit directly supports MP3 playback without having to transcode it to Sony's proprietary ATRAC (Adaptive Transform Acoustic Coding) format, as well as the usual MPEG-1, MPEG-2, and MPEG-4 video playback standards. You can view photos on the HMP-A1 in a slideshow or thumbnail format, and it connects to your computer via USB 2.0. We like the looks and feature set of the Sony player, and Sony always had a reputation for fabulous video quality. You can buy the HMP-A1 through specialty importer Dynamism. Dynamism also

provides technical support for the products it sells to its customers.

Other Players

The Samsung Yepp YH-999 (\$499; www.samsung.com) has an upright

No Video iPod



Curiously absent from the first round of PVPs is Apple, whose wildly successful iPod line currently leads the market for portable music players. Apple was typically tight-lipped about its plans.

"I would never second guess a vendor on whether it should or shouldn't release a particular product," says Steve Kleynhans, vice president of end-user platform at META Group. "However I do expect that Apple will eventually enter the market and will probably release a pretty decent machine when it does. I suspect that by the time it makes an entry, the category will be established well enough that it will not be able to repeat its strong music player showing."

We believe that if and when Apple releases a portable video player, it'll likely be impressive given the success of the iPod. The iPod wasn't the first MP3 player on the market (it came out a year after the Diamond Rio), and now, with far more than 1 million units sold since its December 2001 debut, its features and abilities are well-known.

The reason? Apple's iTunes/iPod combination simplified what used to be a fiddly and complicated process of encoding and transferring MP3s. "The real issue with portable video players will be access to content," says Kleynhan. "Today there isn't a very clear way to get a broad range of compelling video onto most of these devices. ■"

design; it looks like a miniature LCD TV, as opposed to the Creative Zen Portable Media Center's Game Boy Advance styling. The YH-999 features the usual 3.5-inch TFT LCD and video/audio out for displaying your content on an external TV set. The model has a 20GB hard drive and comes fully equipped with a remote control, USB charger, and carrying case. At press time, the player was set to launch in the third quarter, on the heels of the Creative Labs model.

RCA has had a model out for some time now called the Lyra Audio Video Jukebox (\$479 for the 20GB model;

www.rca.com). This, like the earlier Archos AV300 series, has an internal hard drive and a built-in LCD, but it doesn't have digital video recording capabilities just yet. In addition, the Lyra's OS had some bugs early on, requiring several firmware updates. We look forward to seeing what RCA has in store for its next player.

Another player to watch for is the iRiver PMP-120 (pricing unavailable at press time; www.iriver.com). Established in 1999, iRiver is a relative newcomer to the consumer electronics field. It has achieved considerable success with its

digital audio players; now iRiver hopes to do the same with the PMP-120. It has a horizontal form factor similar to the Creative Zen and Sony HMP-A1. It comes with a built-in FM radio tuner, which distinguishes it from other models. Scant details on the iRiver PMP-120 were available at press time. If its prior success with MP3 players and recorders is any indication, the PMP-120 will be a formidable competitor.

BY JAMIE LENDINO

How To Use Your Portable Video Recorder

The Archos AV400 has a TV cradle that acts as a docking station. Place this on top of your TV and connect it to your TV, VCR, or cable/satellite receiver. After you connect the cradle, whenever you want to record content, take the AV400 out of your bag and dock it in its cradle; no further connections are necessary.

Booting up the AV400 takes about eight seconds. Once you're up and running, navigating the AV400 is a snap. The gamepad-style up/down/left/right control gets you around most of the main functions. Because all of these units have 320- x 240-pixel resolution LCDs, it's much easier than using some of the less than user-friendly MP3 players out there. To switch between the LCD and the main screen, hold down the LCD/TV button on the bottom of the unit for three seconds.

Record Video

To make a video recording, select Video-Corder on the

main menu screen. Because the AV400 can record from any source, you have to take extra steps: watch the sound level bar and adjust the input level up and down. If you see the bar moving, you know you're recording sound and video; otherwise, check to make sure your audio cables are connected properly to the VCR or TV. The AV400 will automatically detect if the signal is going to its S-Video or composite video port, as well as adjust for NTSC (National Television Standards Committee), SECAM (Sequential Couleurs a Memoire), or PAL (Phase Alternate Line). The AV400 saves what it records in a default folder called Video on the internal hard drive. If you record protected video, the AV400 will only play back the video on its internal drive; you will not be able to transfer it to a computer.

Make A Schedule

You can also use the built-in scheduler to set up to 20 recordings one

month in advance. The feature doesn't automatically change channels though; for that you have to use the Infrared Emitter Code to control your VCR or cable box, which is a one-time process. After that, you can go online using your PC and use the My Yahoo! TV and calendar scheduler. By doing this, you can set your recording schedule for the week. Here's how to do it:

1. Go to www.yahoo.com and set up a free Yahoo! Account, if you don't already have one.
2. Using your Yahoo! Account, schedule TV shows using the TV and Calendar functions.
3. Connect the AV400 to your computer.
4. Go to your personal My Yahoo! Calendar and choose the Week and Printable views.
5. Click File and Save As and change the location to your AV400 system drive.
6. Click Save As Type To Web Page, HTML Only.

7. Save the file and then disconnect the AV400 from your computer.
8. The AV400 will then automatically update its internal scheduler to match the saved TV programs from your My Yahoo! Calendar.
9. Dock the unit in its cradle. The AV400 will then record whatever programs you have scheduled at the appropriate times.

You'll have to tweak the process to get all of these devices to communicate because the steps will vary depending on what brands and models of hardware you have. We'd like to think that future generations of portable video players will smooth out the process and decrease the number of steps. Even with the added complexity, however, it's hard to beat the convenience of recording TV shows and movies and taking them with you anywhere you go. ■

Forget TiVo, Try PC-Vo

Turn Your Computer Into A DVR

It's been a long, long time since people considered the computer a work-only device. The PC's migration toward a hardware hybrid for entertainment and work continues today as users find new reasons to use computers in leisure time.

As users spend more time in front of their computer screens, it's not a surprise that the other screen they typically spend a lot of time watching—their TV screen—is beginning to merge with the computer screen more frequently.

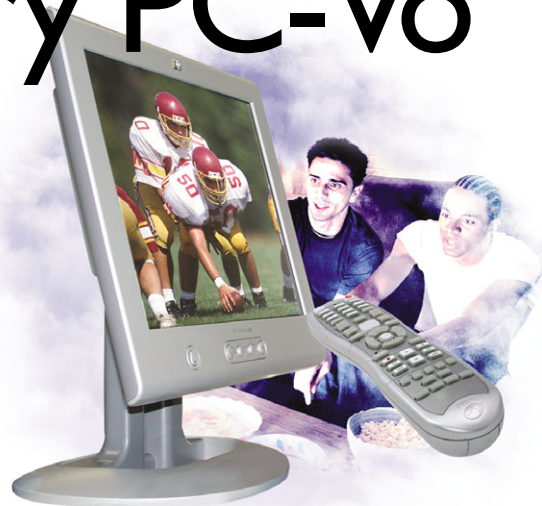
If you want to watch TV shows on your computer, you're undoubtedly also going to want to record those TV shows so you can watch them at your convenience. The brand name "TiVo" may have become part of everyday English language (both as a proper noun and as a verb), but you aren't limited to TiVo or ReplayTV DVR hardware when it comes to digitally recording and managing TV content. Your PC, probably after a few

upgrades, can handle the job just fine.

Media Center PCs

You have a surprisingly large number of options for turning your computer into a PC-DVR device, but it will require some computer-savvy skills on your part. It'll also likely require some new components if you have an older PC. Older computers typically cannot handle the storage or playback demands of digital video, and even a full-fledged upgrade might not provide enough power.

If you're looking for a new computer with easy-to-use and powerful DVR capabilities, you should strongly consider buying a Windows Media Center PC. These computers, which run a special version of Windows XP, are designed specifically for running video and audio.



Because they contain high-end components for multimedia activities, they're more expensive than mainstream PCs (\$1,500 to \$3,000). For many users, the extra money will be worth it because the computers make it easy to use and manage all types of multimedia. For example, Windows Media Center PCs specialize in managing TV functions, digital photos, MP3 audio, and digital video.

At least 17 computer manufacturers are licensed to create Windows Media Center PCs, and the computers are available as both desktop and notebook models. (Visit www.microsoft.com/windowsxp/mediacenter/evaluation/products.msp on the Web for more information on the available brands.) Of course, they still can run other types of software, too, making them powerful options for those in the market for a new computer.

How To Upgrade Your PC For TV

If you'd rather upgrade your current system, you'll first need to take an inventory of your computer's components. Like a bad television sitcom, you may need to put some of your components on permanent hiatus to make your dreams of a PC-DVR device become reality.

It may be easier to buy a Windows Media Center PC, such as this Dell Dimension 4600C, than to completely upgrade an older PC.



Processor. If your CPU isn't a Pentium 4 or equivalent and isn't running at a clock speed of at least 1GHz, upgrading your computer's components probably isn't going to be an option for you.

Video card. This component is key to creating a good PC-DVR device, and it probably will eat up a large chunk of your upgrading budget. Although your PC probably has a video card already, it's likely the video card doesn't have TV tuner capabilities. If you're going to upgrade the video card, make sure it has a TV tuner built in and a variety of input and output A/V ports.

ATI's All-In-Wonder video cards offer TV tuning capabilities, DVR-management software, and DVR-type features, such as recording and pausing live TV. NVIDIA offers its Personal Cinema FX 5700 series video chips, which have similar features and are available in cards from various manufacturers. You can expect to spend up to \$300 for these video cards, but they'll provide the added benefit of high-end gaming graphics and DV management capabilities.

TV tuner card. If you already have an adequate video card, but it doesn't have a TV tuner function, you may be able to add a TV tuner card to your PC. Some external TV tuner devices plug into your computer through a USB connection. For example, ADS Technologies (www.adstech.com) has the Instant TV, an

external box that connects to your PC through a USB 2.0 connection, providing TV tuner capabilities.

Although tuner cards are less expensive (usually less than \$100) than purchasing a new, high-end video card, it might not provide all of the input and output A/V ports that your setup requires. You also could run into some incompatibility issues between the video card and the TV tuner card. In most PC-DVR setups, you'll want to spend a little more for a video card with an integrated TV tuner because you'll have fewer headaches in the long run.

Memory. More is definitely better when it comes to the amount of RAM in your DVR-PC device. We'd recommend 256MB of RAM as a starting point, although you'll almost certainly want more in the future (512MB is a good amount for PC video). If your computer cannot accept more than 256MB of RAM, you may want to rethink your plans of upgrading it into a PC-DVR device.

Because RAM is one of those components that will provide benefits to your PC in many areas beyond its PC-DVR tasks, we'd recommend adding as much as you can afford. Depending on your configuration, you could spend anywhere from \$50 to a few hundred dollars adding RAM to your PC.

Hard drive. When storing digital video from your TV, keep in mind that, depending on the video quality, one hour

of video will require between 1GB and 2.5GB of storage space on the hard drive. If you're storing an entire season's collection of games for your favorite NFL team, it's obvious you'll need a large hard drive, even with all of the commercials deleted.

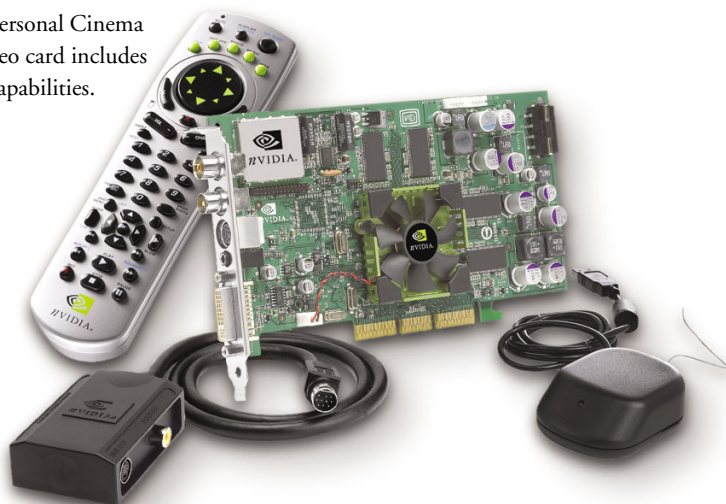
We'd recommend at least a 40GB hard drive to start, although you'll probably end up needing far more storage space. When you're deciding how large a hard drive you need, keep in mind that the software installed on your system and other types of files will be sharing that hard drive with your recorded programs. Your best option may be to add a second hard drive that you use only for DV storage, at a cost of \$75 to \$300.

Optical drive. Most people who will use their computer as a PC-DVR will want to burn DVDs at some point. If you want to add a DVD burner, be ready to spend \$100 to \$200. External DVD burners are easier to set up and install than internal DVD burners. Keep in mind that DVD burners don't work well with older computer systems. Any computer that's more than a few years old almost certainly is not going to offer the processing power or the bus speed needed to burn a DVD without errors. (DVD burning can tax a computer's components to the fullest.)

Operating system. The best OS for a PC-DVR is difficult to determine because the OS doesn't significantly affect a PC-DVR's capabilities. However, if your computer is running Windows 98, chances are pretty good that it's too old to be a good candidate for the hardware upgrades necessary to properly operate as a PC-DVR device. We recommend only running Windows 2000 or WinXP on a PC-DVR. If your computer doesn't have the capabilities to easily run a newer version of Windows, it almost certainly isn't going to be able to handle PC-DVR duties.

Display. The display you use isn't going to affect your PC's ability to record video. However, if you're used to watching TV on a 27-inch flat screen, you're probably not going to be too happy watching playback on a 15-inch CRT computer monitor. Large, high-end monitors are extremely expensive, though, so you might want to send your

NVIDIA's Personal Cinema FX 5700 video card includes TV tuning capabilities.





Instant TV from ADS Technologies gives your computer TV tuner capabilities through an external USB 2.0 device.

Step 1. Collect all of the materials you'll need to connect your cable or satellite TV to your new video card/TV tuner. You'll need a Phillips screwdriver to attach the card to the computer.

Step 1A (optional). If you're replacing another video card, you'll have to uninstall the drivers for your old card before you physically install the new card. However, unless the instructions for your new video card specifically tell you to uninstall the old card's drivers, we'd just install the new card and let the operating system sort out the drivers.

Step 2. Unplug your computer and its components from all electrical outlets. Ground yourself to avoid electromagnetic shock and open the computer case. Find the area where you'll insert the expansion card. If needed, carefully slide any stray wires out of the way.

Step 2A (optional). If you're replacing a video card, unscrew its mounting bracket from the computer. Gently pull up on one edge of the video card to release the card's pins from the connector slot. (The card will be tightly inserted inside the slot, so it will take a little force to loosen it.) Note that some cards require you to press a release button on the back end of the card to remove them. You then can insert the new card in the same slot, as explained in Step 3.

Step 3. Look for an open expansion slot that matches the pins on your video

PC-DVR's output to a TV when viewing your recordings. (See the "From PC-DVR To TV" sidebar for more information.)

Audio. If you're going to watch your recorded programs on the computer all of the time, it'll be easier to justify the upgrade cost for audio components, such as a new sound card and speakers. If you're planning to send the PC-DVR's recorded content to a TV most of the time, you probably can live with your computer's current audio capabilities.

Internet connection. For downloading TV programming guide information, a broadband connection is best. The guide contains a lot of information that can take a long time to download over a dial-up connection. Most program guides will automatically download the latest data when connected to an always-on, broadband connection, too. If you're going to upgrade your Internet connection to broadband, you may need to add an Ethernet card to your PC.

Tackling The Upgrade

If you've determined that upgrading your current PC is your best option, the most important upgrade will be the

new video card or internal TV tuner card. The installation for the two types of cards will be similar. Use the following steps as a basic guide for the installation, but be sure to read the instructions in your card's users manual. Perform a system backup before attempting any system upgrade. (If you've chosen to add an external TV tuner instead, you can ignore these steps and follow the manufacturer's instructions.)

PC-DVR Minimum Requirements

If you're planning to upgrade your computer to make it a PC-DVR, make certain you have components that are powerful enough to handle the taxing task of storing and running digital video. We wouldn't recommend attempting this process on an older computer. Not only will the setup process be much more difficult on an older PC vs. a newer one, but the quality of the playback on your PC-DVR device probably will be less than you want. Here are some minimum and recommended requirements your PC should meet before you try upgrading it to become a PC-DVR device. ■

Component	Minimum	Recommended
Processor speed	1GHz	2GHz
RAM	256MB	512MB
Hard drive	40MB	80MB
Operating system	Win98	WinXP
Optical drive	CD-burner	DVD-burner

card. Most video cards made today connect to an AGP slot, which is used only for video cards and is most likely brown in color. (Refer to your computer's handbook to find the location of the AGP slot in your PC.) Make sure the video card will have enough space around it for cooling. Place the front corner of the card in the slot first; it should slide in part of the way. Then gently rock the card from front to back into the rest of the slot. (The card will fit snugly, so it will require some force on your part to insert it.) You shouldn't need to twist or bend the card to make it go into the slot. Once the card is fully inserted, screw the mounting bracket to the computer. (If the screw hole in the mounting bracket doesn't line up, you haven't inserted the card properly.) Close the computer case. Plug your monitor's cable into the video card.

Step 4. Connect the TV signal feed, usually via a coaxial cable, to the TV input port on the back of the video card. (Most video cards will include a map of their input and output A/V ports in the user manual if you can't find the correct port.) Reconnect your PC's other cables and the electrical power and turn on the computer.

Step 5. As part of its boot process, Windows should detect the new video card. If prompted, insert the CD containing the video card's drivers.

Step 6. Now install your DVR software of choice. You might select standalone DVR software (at a cost of about \$50 to \$100), or you might choose to install the software that shipped with the video card. Nearly all brands of DVR software will walk you through the installation process, letting you set your preferences. The software also should detect your available TV channels and identify all input and output devices. Connect other devices, such as VCRs or TVs, as prompted by the software.

Is It Worth It?

Turning a computer into a DVR certainly isn't an undertaking for those shy about opening their PCs' cases.


The entire upgrading process may take one to three hours, depending on the number of components you upgrade.

Is all of the work required to create a PC-DVR device worth it? If you're part of the group of computer users who love tinkering inside the PC case and who love giving your computer more features than a normal computer, you'll enjoy the process.

Of course, there are those critics who say a CE device designed specifically for DVR duties that costs less than \$300 is far more efficient at recording TV programs than any computer ever could be. (Darn those common-sense police, anyway.) Those critics do make one good point: If you're spending several hundred dollars to upgrade your computer to give it DVR capabilities, you may want to consider a DVR-only component instead.

However, if you'll make use of the add-on components in other ways,

such as gaming or DV editing, it's much easier to justify the cost of creating a PC-DVR device. Also, if you want a lot of control over the recording process, a PC-DVR device typically is going to do a more thorough job of managing your recorded content than a dedicated DVR. You may be able to avoid some TV guide subscription fees by creating a PC-DVR device versus purchasing DVR hardware. Finally, burning a DVD with the digital video content you've recorded from TV is almost certainly going to be easier on a PC-DVR.

If you want the benefits of a PC-DVR device and you're in line for a new PC, you should consider a Media Center PC, as we discussed earlier. You'll have all of the benefits of a PC-DVR without all of the headaches of upgrading. 

BY KYLE SCHURMAN

From PC-DVR To TV

It's pretty easy to play your PC-DVR's recorded content on your TV, at least most of the time. Be sure your video card contains an integrated TV-OUT port or an A/V OUT port if you plan to send your PC-DVR's stored video to your TV. Here's how to send those signals from your PC to your TV.

Step 1. Turn off the TV and the computer. Plug the proper adapter into the video card's A/V OUT or TV OUT connector. Most video cards will ship with the adapters you need. The adapter should at least include RCA Composite and S-Video capabilities, as well as coaxial capabilities.

Step 2A. S-Video will give you the best quality, if your TV also has an

S-Video connection. Plug the video card's S-Video connector into an S-Video cable and connect the other end to the TV.

Step 2B. When using RCA composite cables, connect one end of an RCA video cable to the adapter and the other end to the TV. You'll then probably need to plug the audio cable from the adapter into your computer's sound card Line In jack. From the Line Out jack, insert an RCA Composite cable that has two plugs on the other end; insert them into the Audio In jacks on the TV. (You may need a splitter to connect your computer speakers to the audio card, too.)

Step 2C. If you're using coaxial cable, just

plug one end into the video card's coaxial cable connection and the other end into the TV. However, this option will provide the lowest-quality video.

Step 3. Follow any special instructions in your video card's users manual and in your DVR software's users manual to adjust the settings properly for TV output.

Some TVs only can accept resolutions up to 800 x 600. If you're having problems making your recorded video content appear on your TV, try lowering your PC's resolution to 640 x 480. If you have other problems with making the video appear on your TV, try consulting your video card's manual. ■

The Electronic Garage

Automotive Diagnostic Tools For The Home

Pain. That's what a lot of car owners feel when they walk into an auto repair shop. Pain because they know something is wrong with their vehicle (a warning light is aglow, or there's a peculiar knocking sound from under the hood), and pain because they know the repair fees might be astronomical. Most of us have discovered that getting car service is usually anything but quick and easy. Many repair shops charge about \$75 just to tell you what's wrong, and that's before they even start fixing the problem. But with the right tools, you can make some car diagnoses yourself, which can save you time and money.

Car diagnostic software from companies such as AutoTap (www.autotap.com) and EASE Diagnostics (www.obd2.com)

provide a comprehensive (and easy to understand) diagnostic overview of your vehicle. To use the programs, you just plug a scan tool into the computer port on your car (it's usually located right under the steering wheel), run the software on your laptop or PDA (connected via USB), and check the readouts. You can find out what's wrong with your car before you take it to the shop, or you may decide to make the repairs yourself (assuming you're comfortable working on cars).

"Some shops are very diagnostic-savvy and devote much of their effort towards solving drivability problems, whereas others only perform diagnostics on an 'as needed' basis," says Matthew Forsyth, an EASE Diagnostics spokesperson. "Typically, the shops that are diagnostic-heavy

charge more to perform those services, but they are also better equipped to make those kinds of repairs."

In this overview of car diagnostic tools, we'll explain some of the benefits of using them and which products are available (and for how much) and cover some of the innovations in the do-it-yourself diagnostic industry. We even took one of the tools for a spin to see, firsthand, how they work and how easy they are to use.

Car Diagnostics 101

It all started back in 1982. Personal computers were mostly a glimmer in Microsoft's eye, but the automobile industry was already moving toward computer-controlled powertrains and engine timings. The auto industry began a widespread shift from carburetors to fuel injection, and computer technology in general was finally hitting the mainstream. Engineers knew, even in this early stage of auto technology development, that there were better computational rather than mechanical means of controlling automobile engines. The EPA was also concerned about excessive car emissions, which computers could help control.

"In the '80s there were a lot of performance chip products that gave you more power just by replacing the PROM (programmable read-only memory) in your computer," says Don Wiencek, AutoTap's CEO. "The main thing those products did was advance the timing and warn the user to use premium fuel."

Unfortunately, each car manufacturer, from Honda to Chevy, used a different computer chip, and there was no standard way to access the PROM. Still, dedicated do-it-yourselfers found a way to tap into their cars' computers, often relying on proprietary handheld scanners that did little more than turn off engine lights.

"Back in the 1980s, the only products that were originally available for vehicle scanning were tools made by the car companies themselves," says Forsyth. "As the years progressed, several other aftermarket manufacturers got on board with their own proprietary, handheld, DOS-based devices."



With help from the EPA, the car industry developed OBD-II (On-Board Diagnostics, 2nd generation), a standard computer interface. All cars sold after Jan. 1, 1996, had to include OBD-II. Originally, the idea was to make sure there was one way to check vehicle emissions. Since then, emissions laws have become so stringent that most cars easily meet or exceed the requirements. Auto diagnostic programs use the port to read emission data, but they have expanded to read powertrain data, sensors, and even your vehicle's fuel octane rating.

OBD-II uses a 16-pin DLC (Diagnostic Link Connector) port. The port reads data directly from the PCM (powertrain control module) car computer. Providing a standard interface helped birth a new software segment, but it has been slow to develop. One reason is that many of the cars released with the port were still under warranty up until just a few years ago, so even the most diehard home mechanic would still bring the car into the shop for a quick (and free) inspection.

Also, the average car on the road (according to AutoTap) is about nine years old, which means the vast majority are still too old for at-home diagnostics. However, there are still millions of cars with the OBD-II port.

Car Diagnostic Options

One of the most popular methods for diagnosing car problems is to use proprietary handheld scan tools, such as those



If you don't have a laptop or PDA, you can use a dedicated code scanner such as this one from Actron to diagnose your car's ills.



You can use the AutoTap program with your PDA to check your car's health.

made by Actron (www.actron.com). These portable devices connect to the OBD-I or OBD-II port on your vehicle and list trouble codes and service warnings. The advantage is that you can quickly connect to the port and read the codes without having to use a laptop. Scan tools let you turn off service engine lights but don't usually monitor emissions and car problems in real-time with the engine running. You can find out quickly if your vehicle will pass emissions tests, however, by reading the stored car computer emissions data.

Actron makes two versions of its handheld scan tools. The Actron OBD-I code scanner (designed for 1982 to 1993 vehicles) comes in three versions: one for Toyota, Nissan, and Honda imports; one for Ford; and one for GM. This ultra-basic scanner will read trouble codes and display them on the dashboard Check Engine light. Once you get the code, you can find out what it means online at www.actron.com/media/categories/GM_ABS.pdf and then diagnose the problem.

A more advanced version, the OBD-II AutoScanner CP9135 (\$179.95), works with 1996 or newer vehicles and displays a code on the handheld's LCD screen.

Another diagnostic category involves software that runs on a PC or PDA. Diagnostic software serves two basic functions: It tells you what is wrong with the car so you can, in turn, tell the mechanic at the repair shop what needs to be fixed, or it helps you diagnose the problem so you can make the repair yourself. Either way, most diagnostic programs are simple to use, as anyone can own a car, not just computer experts. It's easy to connect a device to your car's OBD-II port, and the software usually consists of easy-to-read graphics and text. Interpreting that data is more difficult. In some cases, a diagnostic software company will provide a tech support line to help you understand the data. In other cases, you can look up codes on the Internet or consult an online help system.

Most of the current scan tools use either a USB or serial cable to connect your laptop to your car. Some companies, such as AutoTap and EASE Diagnostics, provide a Palm or Pocket PC-based version that connects to the serial port on the handheld. The cable is usually thicker and more rugged than most USB cables so you can use it in a garage setting. Diagnostic programs typically read the general OBD-II data (related to emissions and fuel) and provide extra databases that can read about 100 additional parameters for various makes and models. For example, EASE Diagnostics provides generic OBD-II scan modules and enhanced modules for Chrysler, Toyota, and Ford.

Service shops use additional computer-based tools using expensive equipment that can read additional data. For example, they can tell how much brake pad is left or whether there had been a car security intrusion. They can also show how many times the air bag has been deployed. None of these products is designed for the consumer. In fact, only the OBD-II interface works with a standard computer (usually a laptop), a PDA, and a standard USB or serial connection.

In addition to diagnostic software, there are tools designed for auto mechanics that



There are many tools you can use to run diagnostics on your car, but your laptop is one of the best.

let you reprogram the PCM such as those from Hypertech (www.hypertech.com). Reprogramming tools are not as useful today as they once were, mostly because modern-era automobiles already fine-tune the engine as you drive. There's not a lot of tweaking you can do beyond what the computer already does. Programming tools do work well for those who want to replace stock car parts with custom parts that need additional fine-tuning.

One company, Meta-Cog (www.meta-cog.com), makes diagnostic software (Motor Trend Autotech; \$14.95) that doesn't connect to the car at all and includes a series of questions and answers to help you determine what's wrong with your vehicle. "Higher-end tools will show step-by-step diagnostic and repair instructions," says Eric Gartner, a Meta-Cog spokesperson. "Some tools, such as the Mitchell On-Demand CD system (an Internet-based system used for repair estimating; go to ondemand5.com), will provide instruction on clearing the computer memory bank of trouble codes, interpreting the codes in the context of ambient conditions, and other more professional-level functions."

Make The Right Diagnosis

In most cases, running a diagnosis program is the only step you'll need to take before you bring a car in for service. You can determine exactly what the engine lights mean, for example, and determine whether there is a serious problem. A basic scenario: The service engine light will turn on automatically on most late-model cars as soon as the odometer reaches 75,000 miles, which indicates it's time for a tune-up. You can typically turn off the engine light with a diagnostic program and then perform some of the routine maintenance yourself (such as changing the oil and the spark plugs).

Diagnostic programs can also help you pinpoint what needs to be repaired so your service shop fixes the problem without selling you a repair you don't need (something we all loathe). For example, if you think your car has a performance problem (the accelerator just doesn't feel responsive, or the engine loses power on uphill climbs), you can use a program such as AutoTap to determine whether there is a fuel problem. You can print out a report from the program and

bring it to the repair shop, which will help your mechanic determine the problem.

There are also times when the information you get from the service shop just doesn't seem right. For example, let's say the transmission on your vehicle seems sluggish and won't shift correctly when you first drive the car. If you bring your car to a service shop, you can compare their testing results with your own diagnostics. This can save time and money, especially if a service shop is about to make a costly error. There's even a safety benefit: Diagnostic software can help you determine if your vehicle is emitting harmful emissions, requires immediate attention, or is unsafe to drive and needs to be towed to the closest repair station.

Future Enhancements


Soon, auto diagnostics at home could become a regular maintenance function, as commonplace as oil changes and a car wash in your driveway. One of the most important steps will be when the auto diagnostic companies finally get support from import car manufacturers who have

not been willing to share their OBD-II databases. According to AutoTap, the major import companies, including Honda and Toyota, prefer that you bring your vehicle into an authorized dealer.

Another potential area for expansion: If the car manufacturers comply, they may start feeding more data to the OBD-II port including body chassis data, ABS and airbag information, and more detailed emissions data. And, the CAN (controller-area network) communications layer will become available by 2006. The enhancement, which runs at 1MBps (megabyte per second) and covers the entire length of the car, could become a more viable method of extracting diagnostic data. One of the real challenges, though, is that every year, vehicles are becoming more complex, even for the most educated amateur mechanic.

"Just as the tools to scan vehicles have become more sophisticated, so too have the vehicles that they are scanning," says Forsyth. "Connecting a scan tool and extracting diagnostic data from a vehicle's computer is a pretty straightforward process, but interpreting that data is another question. If the consumer has a sufficient working knowledge of their vehicle's engine control system, then they can correctly perform basic repairs on their own, saving both time and money."

To attract new customers, auto diagnostic software companies will need to keep pace with the auto technology advancements and make their products just as easy to use as they are now, which might require offering multiple layers of information: basic diagnostics, advanced, and professional. One company in particular, EASE Diagnostics, is planning to provide an 802.11b wireless version of its product that interfaces with a Palm or Pocket PC so you can scan your car anytime without even going into the garage.

This is a step in the right direction for auto repair tools that have been slow to develop. Still, someday we may all scan our Suburbans on a regular basis, taking the fear and anxiety out of a trip to the service repair shop. 

BY JOHN BRANDON

AutoTap

It comes in a bright red box and works wonders on domestic vehicles, including most GM, Ford, and Chrysler brands. AutoTap for Windows AutoTap is a streamlined PC program that scans your vehicle for emissions leakages, powertrain data, fuel consumption, and about 150 other parameters. Although you can only scan for basic emissions data on an import vehicle, AutoTap is working hard to provide a database upgrade for foreign vehicles. As a diagnostic program, AutoTap is easy to use and powerful enough for weekend mechanics and features a colorful, customizable interface.

We gave AutoTap a try and found that the program is as simple to use as any Windows program. It took us less than five minutes to load the software, and Windows XP automatically detected and loaded the USB driver. To connect the cable, just plug it into a free USB port on your laptop and then connect the OBD-II cable to the OBD-II port, which is located right under the steering wheel on most cars. On the 1998 Honda Civic we used, the port was tucked back a little behind the dash, but it was still easy to find. On a 1999 Chevy Suburban, if you look down just a bit to the left of the steering wheel, you can see it while sitting in the driver's seat.

After connecting the cables between our laptop and the car's OBD-II port, we turned the key in the ignition just enough to turn on the car's dash lights and radio. AutoTap scanned both vehicles perfectly, providing a generic set of emissions data for the Honda (about 20 parameters mostly related to the O2 sensors, which gauge the flow of air and fuel into the engine manifold) and about 150 parameters for the Suburban. We also started the engine to see how AutoTap analyzes the engine while it's running.

When the program first starts, it checks for any engine problems (we didn't have any on our test vehicles). If the program finds any problems, you see a list of "trouble code" errors, which you

can look up in the online Help file. If you need more help, you can call AutoTap's technical support line and ask about specific errors and diagnostic results.

If you don't find any trouble codes, you can just browse through the software and run diagnostic tests. In the program, you can open a graph or gauge by selecting a menu option and then insert the parameter you want to view. For example, if you select a throttle gauge option, you can push down on the accelerator and watch as the gauge measures foot pressure. Each gauge is customizable so you can change its size, shape, and color.

One of the most useful gauges had to do with the O2 sensors. Because this is one of the most common vehicle problems, we found that we could check individual sensors and watch the air and fuel intake on separate data streams (one in purple; one in green). The scanning interface looked like an EKG, reporting the exact fluctuations and O2 intakes. The AutoTap diagnostic routines run about 40 times per second. There's a data logging feature where you can record the gauge and play it back later when you get back into the house.

There's really only one complaint when it comes to scanning an automobile with AutoTap: Using a laptop in a car is uncomfortable at best because the cord is only about 6 feet long and you have to either rest the laptop on the car hood or place it precariously on the seat. We would have preferred a much longer cord so we could park our laptop on a nearby desk or workbench.

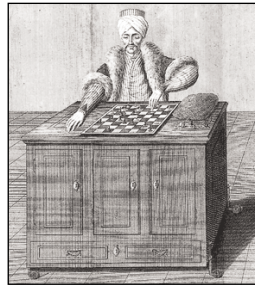
Still, that's a minor complaint when it comes to software that has a real-world money-saving effect. AutoTap provided an extensive amount of diagnostic data, providing details about our vehicles that we knew we could use if we needed to discuss car problems with the service repair shop. And it's fun to use: You can poke around inside your car engine without any concerns about making unnecessary adjustments to your car. ■

I Compute, Therefore I Am

Artificial Intelligence In Everyday Life

Artificial intelligence, the thinking machine. It's a dream that's been with us since the earliest glimmerings of the Industrial Revolution. Leaders of nations envisioned armies of perfect steel soldiers who would obey commands without a thought and fight tirelessly. The middle class understood it to mean automaton servers to handle all menial chores: the perfect servant. For everybody, it was the genie from the bottle, providing a source of free food, cheap housing, and ubiquitous labor. And just as with the pre-Industrialist pipe dream of alchemy, which commonly was understood to produce gold out of base metals, so all the speculation about thinking machines produced a number of spectacular frauds.

The most outrageously successful of these was The Mechanical Turk. It was a clockwork machine unveiled in 1769 by Wolfgang Kempelen, a civil servant, to please the court of the powerful Empress of Maria Theresa of Austria-Hungary. The "machine" was a chess player with few peers and enjoyed a career of 85 years before the assembled luminaries of Europe (and visiting Americans, too; Benjamin Franklin played against it). Kempelen wound up the mechanism with a giant key, and the Mechanical Turk used its left hand to move pieces. Once largely accepted, today the fraud is widely known (the prevailing theory maintains that a small man concealed within the Turk's base actually controlled its movements) and frankly



Kempelen's Mechanical Turk (in a contemporary drawing) played a great game of chess back in the 18th century, but it was a magnificent fraud.

admired for a fine piece of work in its own right.

But the dream of AI lived on, and developments in computer science engendered massive speculation after WWII. Alan Turing wrote a paper in 1950 entitled "Intelligent Machinery," arguing that computers would eventually be created that mimicked the human brain. Norbert Weiner developed feedback theory, suggesting that intelligent behavior was at least in part the result of feedback mechanisms that could be artificially emulated. The term "artificial intelligence" itself was coined at a Dartmouth conference in 1956, and John McCarthy created the most commonly used AI language today, LISP, in 1958.

What Is Artificial Intelligence?

It depends upon whom you ask. AI has been studied from several methodological standpoints over the years. Four schools of thought have arisen, each with their own definitions, but, for our purposes, two are of particular importance.

For the first we turn to R.E. Bellman who wrote that AI is "the automation of activities that we associate with human thinking, activities such as decision-making, problem solving, learning. . . ." University of Chicago Professor of Philosophy John Haugeland put it even

more succinctly when he wrote of "machines with minds, in the full and literal sense." This is the Human Thought approach, a cognitive definition of AI that has grabbed the imagination of the public, making pop culture appearances in everything from Fritz Lang's 1927 classic, "Metropolis," with its robotic version of a scientist's dead wife, to HAL in "2001: A Space Odyssey" and the android Data in "Star Trek: The Next Generation."

Elaine Rich and Kevin Knight succinctly stated our second definition in their book "Artificial Intelligence," when they defined their subject as "the study of how to make computers do things at which, at the moment, people are better." It's a modern AI restatement of the old "walking duck" test with which we're all familiar and can be explained in context as, "If it walks and acts like a duck, it is a duck, even if it's a computerized duck." We'll call this **human action**, where the emphasis is on simulating human activities. It's this definition of AI that has yielded the greatest practical results to date. Let's examine some of the ways that these kinds of AI filter through into our daily lives, both in an obvious and subtle fashion.

You Will Meet A Tall, Dark, Handsome AI . . .

Few people think of an AI as a person dressed in an outrageous shawl and tatty print dress, pouring over a crystal ball. Yet human action AI has proven itself extremely good at making predictions; programmers use the knowledge of experts to create elaborate computerized rules sets, also called knowledge-based systems. These consist of enormous numbers of If-Then statements that codify a given expert's observations and conclusions. An AI created in this manner has no comprehension of the experience or value judgments of an expert, but it can do an excellent job of quickly analyzing data and applying that expert's knowledge to reach conclusions.

Instances of this type of AI are common in human activities that involve the collection and study of vast amounts of

information. Perhaps the most celebrated is MYCIN, a computer program designed at Stanford University in the 1970s to do two things: diagnose blood infections and recommend courses of treatment. MYCIN's development was important because full diagnoses involved growing cultures, too lengthy a procedure given the virulence of many infections. Knowledgeable physicians, therefore, made "expert rough assessments," and MYCIN was designed to pass this accumulated knowledge along to nonspecialists and junior practitioners. Other, more sophisticated examples of this AI were created after MYCIN, including PUFF, which studied heart disorders.

This kind of predictive AI based on past human experience operates outside the hospital, as well. The meteorological and infrastructure industries use it all the time. For example, the Iowa Department of Transportation supported an AI project to evaluate conditions of low visibility on a major highway and supply driver information based on the results. Oil and mineral exploration firms predict deposits through AI software; back in 1997, the New South Wales Department of Mineral Resources and Japan's cutting-edge NEDO (New Energy and Industrial Technology Development Organization) developed AI programs to find coal in the Gunnedah and Hunter regions of Australia.

Brokerage firms, too, employ their own customized AI systems to quickly gather and analyze data from various real-time markets worldwide and determine when to buy and sell stocks and bonds. And down on the farm, they're no slouches when it comes to knowledge-based systems. CO-MAX is an AI in the field of cotton crop management, while POMME employs computer modeling to suggest appropriate pest treatment for apple orchard management.

Computers Speaking In Tongues

NLP (Natural Language Processing) is another area where AI has infiltrated our lives. We encounter it on the telephone and at automated service counters. We hear it when we attempt to discover the arrival or departure time for a plane, or while purchasing household goods replacement parts by phone. That voice that asks questions and moves you to your destination employs NLP to frame its comments in proper syntax.

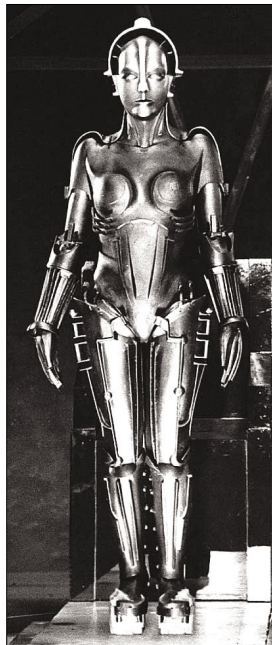
NLP is often applied in tandem with a Human Thought form of AI that relies on pattern recognition. This AI actually stores and analyzes human comments for frequency response, sounds, pauses, etc. Thus, by building a library of all the versions of the phrase visual imaging it hears, pattern recognition helps this AI become increasingly familiar with spoken variants. It starts out with fairly limited abilities, like a person learning a new language who misses hearing words he already knows because the speaker is speaking too fast, garbling sounds, or employing an unfamiliar accent. But as that library grows, pattern recognition builds and helps NLP categorize sounds that are near-but-not-quite matches. Not surprisingly, this is also the kind of AI that's used in voice-controlled computer interfaces

for handicapped users and those who simply want their computers to respond both to voice commands and physical input.

Would You Like To Play Another Game?

AI proponents have been encouraged by the successes of IBM's chess-playing supercomputer, Deep Blue. In 1997, it won

In the 1927 Fritz Lang film "Metropolis," the mad scientist Rotwang attempts to re-create his dead wife—as a thinking, metal humanoid.



a six-game match against reigning world Chess Grandmaster Garry Kasparov, with two games to Deep Blue, one to Kasparov, and three ties. According to the Deep Blue team, Deep Blue studied 200 million positions each second, and it used the power of 256 processors working in tandem.

IBM is candid about its brainchild. "Deep Blue, as it stands today, is not a learning system." But even though Deep Blue doesn't really think about chess, much less about anything else, its rules-based simulation produces results that are amazingly good. You can sample this yourself with any of its lesser cousins available for retail purchase—such as Ubisoft's Chessmaster series (\$39.99 PC, \$29.99 Xbox; chessmaster10.ubi.com/us), the most venerable in its game genre on the market. Chessmaster operates at Master-level strength, and its coding is sufficiently sophisticated to analyze an enormous number of games in its data banks played by Masters and Grandmasters, living and dead, and emulate their various styles on demand. Even if you prefer less of a challenge, the game's 150 computerized opponents include many based on nonprofessional players who simply enjoy the game and whose skills encompass a broad range of difficulty levels.

Play Or Work? Game AI As A Training Tool

While we're on the subject of games, some computerized game simulations have been so well-received that they've jumped the barrier from game-for-play to tool-for-teaching. For instance, back in the 1980s, the U.S. Army reworked an action game, entitled Battlezone, to create a controllable mock-up of the Bradley Infantry Fighting Vehicle. The Marine Corps did its own version for its personnel of the popular shooter, Doom, called Marine Doom, as a beneficial exercise in speed and coordination. And the U.S. Department of Defense used the popular action simulation game Rainbow Six: Rogue Spear (www.roguespear.com) to train its

people in small-unit operations held in urban terrain.

On a more pacific front, the Department of City and Regional Planning at the University of Cardiff, Wales, uses Maxis Software's classic city-building game *SimCity* as a training tool at an undergraduate and post-graduate level. According to the Department, it provides "a valuable graphic introduction to the way in which cities might actually grow, given particular land allocations." No one is suggesting that the game truly represents a uniform way people in different cultures react to urban design, but as a method of teaching city planning basics, *SimCity* is both useful and fun.

Finally, no discussion of games and AI would be complete without a brief mention of Gameware Development's *Creatures* series (www.gamewaredevelopment.co.uk). Created in the early 1990s by computer scientist Steve Grand (who now heads Cyberlife Research; www.cyberlife-research.com), these innovative "computer toys" employ Human Thought AI to let you raise and train animated creatures that learn small vocabularies and a host of good or bad habits in a complex environment—as their teacher, the results are up to you.

Going Where No Robot Has Gone Before

Another area where AI comes into play is that of robotics. The first documented robot arm was the *Rancho Arm*. Developed in 1963 at Rancho Los Amigos Hospital in Downey, Calif., this six-jointed tool for the handicapped was computer-controlled. Later models were far more sophisticated; Mobility was added in 1971 when the Stanford Research Institute developed *Shakey*, an AI-controlled robot that used a TV camera, bump sensors, and a laser range finder to derive information about its environment as it moved. Shigeo Hirose's *Soft Gripper* (1976) was capable of conforming the shape of its grip to the object it held, for example. It's a



Ubisoft's *Chessmaster 10th Edition* game lets you play against a number of AI-based opponents, each with its own playing style.


long way from all this to 2001 when a Global Hawk robotic spy plane charted its own course on an 8,000-mile trip between the United States and Australia.

Even that development pales a bit before the remote robotic rovers developed by NASA and its foreign counterparts for planetary exploration. The Mars rovers' AI, for example, supports gathering information about their surroundings and making informed decisions. If one of these robots is supposed to get to a point 50 yards north and there is a rocky outcropping in the way, the code is sufficiently "clever" enough to tell it to go around the outcropping for a certain distance and length of time in an effort to continue north. If the outcropping continues past the time and/or distance the rover's programming allows, the robotic unit returns to base. In the meantime it provides valuable information on its way back home.

What's Next?

What does the future hold? John McCarthy, Professor Emeritus of Stanford University and one of the early pioneering visionaries of AI, continues to

paint a rosy future of computer-controlled cars; completely automated home deliveries; personally owned, self-piloting flying machines; and even that pipedream of bygone years, robotic household servants. It would seem that anything is possible, provided the Four Horsemen of the Apocalypse (War, Famine, Pestilence, and Death) are kept too busy playing a chess game against Deep Blue to worry humanity.

But even the most resolute skeptic would have to acknowledge that AI has become an integral part of modern society. Its role is expanding, as well. There are more than a dozen major research projects underway to design self-administering AI-based traffic systems, including air traffic control. New, more sophisticated AI tools in areas as diverse as mining, surgery, and language translation are in development. Don't expect "Star Wars" R2-D2 to show up on your doorstep, but do expect AI to continue exercising a beneficial effect on the world around you. 

BY BARRY BRENESAL

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Pixa DHT-100 All-in-One DLP Home Theatre Projector

Home theater enthusiasts are snapping up large direct-view and rear-projection television sets, but if you want to graduate from enthusiast to certified aficionado status, a front projector may be the best way to go. Pixa's DHT-100 is an interesting hybrid that combines a DLP (Digital Light Processing) front-projection system with a progressive-scan DVD player, and although this arrangement is convenient, the preproduction DHT-100 we tested has some significant drawbacks.

The projector has a native resolution of 800 x 600, so it is not the best choice for HDTV, and the 4:3 aspect ratio is not exactly ideal for viewing widescreen 16:9 DVDs because pixel rows at the top and bottom of the screen will be turned off. Regardless, when the system is properly configured, its DLP innards project video with stunning color that doesn't have a trace of **ghosting** (afterimages that trail behind objects that are in motion during high-contrast scenes). DLP creates color using spinning color wheels, and this method sometimes produces a "rainbow effect," where bands of red, green, and blue are visible on the edges of high-contrast objects, particularly during on-screen motion. Some people are more aware of the rainbow effect than others, but everyone who viewed movies on this projector saw the rainbow artifacts. We tested the projector with other video sources, including an Xbox and laptop computer, and the resulting video quality was excellent in terms of color accuracy, brightness, and contrast, but the rainbows were still apparent.

The projector's low price may make these artifacts easier to dismiss, but the DVD player has some serious problems. Movies skipped periodically, and after only a week of use, the drive refused to eject one of our discs. The DHT-100's



Pixa DHT-100 All-in-One DLP Home Theatre Projector

\$2,499

www.pixainc.com

playback quality was decent when the DVD player worked properly, but we connected a separate DVD player to the projector, and its playback quality increased dramatically. Considering the playback problems we experienced and the fact that the optical digital audio output refused to send a Dolby Digital signal to our audio system, we can only

assume that the drive was defective, and we hope these wrinkles will be ironed out in the production units.

The DHT-100's inputs are easy to configure thanks to the on-screen tabbed menus, but making actual adjustments is difficult because of the unresponsive remote control. No matter what angle or distance we held the remote, the unit was slow to react to commands. Zoom and focus knobs on the unit itself make it easy to get a sharp image no matter where the projector is placed, and although the specifications say that screen sizes of up to 285 inches diagonal are possible, smaller sizes are recommended. We achieved great results with a 100-inch 16:9 projector screen. Whites are brilliantly bright, and blacks are an extremely dark shade of gray, assuming the viewing room has good light control.

The DHT-100 is a decent entry-level projector that serves a number of roles but doesn't excel at any one thing. Including a DVD player was a brilliant idea that, unfortunately, was not implemented well, so budget for a DVD player if there's a DHT-100 in your future. ●

BY TRACY BAKER

Budget For Extras

If you're thinking about buying a projector so you can throw a big picture up on a bare wall, forget about it. A dedicated screen is required to get the most out of the device. We tested the DHT-100 with two 100-inch screens from Carada (www.carada.com), and they dramatically enhanced the video quality compared to projecting video on a wall. Just remember that because of the unit's relatively low resolution, you have to sit 10 to 20 feet away from the screen to avoid seeing the individual pixels that make up the video (this is called the "screen door" effect).

Screens come in two basic colors (white and gray), and for this projector we recommend a white screen. Gray screens help boost black levels, making shadows and black portions of the video deeper, but gray screens tend to reproduce relatively dull colors and less bright images. White screens reflect light superbly, produce more vibrant colors, and make pure white portions of the video look great, but this comes at the expense of black levels, which are not quite as deep. Try to find a screen manufacturer that will let you test out both types of screens and return the one that doesn't look as good with your particular setup. Also keep a spare projector bulb handy; nothing is worse than throwing a movie party only to have a bulb burn out. ■

Magellan RoadMate 700

At last, we have a GPS (global positioning system) receiver that does everything exactly as it should. Forget about laboriously loading maps for the area in which you drive using a PC connection. The Magellan RoadMate 700 contains street-level map information for the entire United States on its internal hard drive. Forget about squint-ing at a tiny screen trying to figure out where you are. This unit has a customizable, full-color, backlit touchscreen that is among the most legible we've ever tested. And forget about preloading immutable route information before you head out. On this device you simply tap in an address to get routing information nearly instantaneously. This is the rare case of a product truly living up to the marketing materials.

The unit mounts securely to a windshield using the enclosed suction-cup mounting bracket, and its intelligent design and intuitive menus make it a snap to use. To create a route to a specific address, for example, you use the touchscreen to key in the name of the town, then the street, and then the street number. This process is simplified by the unit's QuickSpell feature, which eliminates letters based on what you've entered and what is in its database. For example, when entering a city name, you begin with an entire alphabet of letters, but if the database knows there are no towns that begin with an O immediately followed by a Q, the letter Q is grayed out after the O is pressed because it is an invalid entry.

Once users enter an address, they can ask for routes based on shortest distance, shortest time, least use of freeways, and most use of freeways. A few seconds later, the RoadMate 700 spits out turn-by-turn directions that it can display in a variety of ways. Looking at the map or direction list all the time is annoying and potentially dangerous, but the RoadMate 700 also provides clear voice prompts that tell users when

turns are approaching, which direction they'll turn, and what side of the street their destination is on.

Auto-rerouting is one of the unit's best features. If an exit on the proposed route is closed, if you have to dodge up a few blocks to grab something at the store, or if anything else takes you off of the highlighted route, the RoadMate instantly recalculates a new route based on your current location. No interaction from the user is necessary, and depending on where you live, it is a great way to find alternate routes to and from big events that tend to cause traffic snarls. The device is compatible with WAAS (Wide Area Augmentation System), making it accurate down to just a few feet, and it did an outstanding job of precisely tracking our movement.

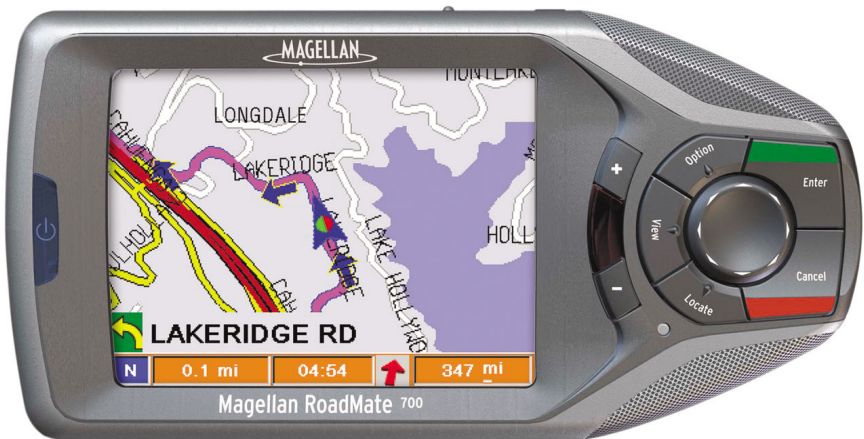
The only drawback to this unit is its price. It's not the most expensive GPS receiver in its category, but not everyone can spend more than a grand to plot an efficient route to Grandma's house. Accessories such as AC adapters and extra mounting brackets are also expensive when ordered directly through Magellan, so try to find a local or Internet retailer that will cut you a deal. Aside from that, this is the best GPS for vehicle use you can buy outside of a factory-installed unit from a new car dealer, and gadget nuts will find themselves driving out of their way just to watch the unit bring them home time and again. ●

BY TRACY BAKER

Magellan RoadMate 700

\$1,499.99

www.magellangps.com



Share A Mount

You probably won't need to purchase a separate car mount if you plan to share the RoadMate 700 among multiple vehicles. The suction-cup mount it comes with attaches securely to a windshield with very little hassle but is easily removed for use with another vehicle with the flip of a switch. There's not even a need to detach the RoadMate 700 from the mount to do this; just release the suction cup and move it as one unit to the other car.

Even if you want to mount the unit permanently, the suction cup mount has several advantages over other types of mounts, such as those that fit into a vent. It doesn't interfere with air conditioning, and leaving the device on the windshield gives the antenna a better view of the sky, which in turn gives the receiver a better line-of-sight to more GPS satellites. ■

LG LST-3410A Set-Top Box

Interested in recording and controlling high-definition television programming, à la TiVo? LG's LST-3410A set-top box combines a high-definition signal decoder and a DVR (digital video recorder). LG's attention to usability and quality fulfills the device's potential, creating a must-have component for HD television aficionados.

The LST-3410A's dual tuner decodes standard-definition NTSC (National Television System Committee) signals (at 480i [interlaced] resolution) and digital ATSC (Advanced Television Systems Committee) signals at 480i, 480p (progressive), 720p, or 1080i. You can specify a set resolution or let the tuner adapt to the source and monitor. Both formats use standard antenna and cable coaxial inputs, in addition to composite video and FireWire connections. The LST-3410A has a full set of outputs, including DVI/HDCP (Digital Visual Interface/high-bandwidth digital content protection), RGB (red-green-blue), component, composite, and S-Video outputs. Digital optical and RCA outputs round out the audio capabilities.

The LGDVR LST-3410A sports a 120GB hard drive for the DVR—enough for 12 hours of HD or 60 hours of SD (Secure Digital) recording. LG included the usual DVR time shifting and recording functions: live TV pausing and rewinding, one-touch recording, and a menu that indexes recorded programs. But one of its most impressive features is the implementation of the EPG (electronic programming guide). LG uses TV Guide On Screen, with an intuitive and attractive interface (similar to your cable company's program listings). Schedule recordings, browse channels, create Favorites lists, or retrieve detailed programming information with a few clicks of the remote. Best of all, the service is entirely free and downloads automatically without a phone or Internet connection.

You can easily set up the LST-3410A with the helpful Quick Setup Guide and its great diagrams. The TV Guide On Screen EPG requires little configuration—



LG LST-3410A Set-Top Box

\$999

www.lge.com

just walk through the brief wizard. The menus are easy to navigate and include useful features such as channel scan, DVR recording quality controls, and aspect ratio controls. More importantly, the EPG and DVR functions are a cinch to use. TV Guide is never more than one button away, and the LG's remote is well-designed. Time shifting, recording, and playback are similarly simple. A Program List shows thumbnails of all recordings, with

time and listing information for each. Our only complaint is that channels are grouped by type (digital and analog in groups) rather than ordered by number, which can be awkward when channel surfing.

The LST-3410A's image quality is excellent, as we expected (we tested it using Gateway's 56-inch 720p DLP projection TV). And recorded HD material doesn't exhibit any perceptible loss in quality. The ability to match the LST-3410A's resolution output to both your source and destination resolutions helps ensure the best possible image for your display.

If you're converting to the HD way of life and want nearly effortless control over DVR programming, the LG LST-3410A is a no-brainer. It's priced higher than separate HD tuners and DVRs, but the LST-3410A's ability to record and play HD material and its ease of use make it a solid HD tuner. ●

BY GREGORY ANDERSON

Archive DVR Recordings

LG's instructions mention archiving your saved HD recordings to a D-VHS deck but make no mention of archiving the shows to more common (and lower-quality) media. You'll need somewhere to offload all those "Simpsons" episodes you haven't got around to watching yet, so we'll show you how to save those programs to VHS tapes or DVDs.

Standard-definition DVRs make it easy to archive recordings to a VCR or DVD recorder. LG doesn't make it quite as easy, but you can still do it. Keep in mind, though, that you'll lose that spectacular high-definition video quality and multichannel audio when you save your HD recordings to SD media such as videotapes. Even for SD recordings, the conversion through analog signals will often affect image quality.

To archive recorded shows, change the LST-3410's Display Format setting to the highest quality connection your recording device can accept. For example, we connected the LST-3410A's composite A/V outputs to a VCR's front-panel inputs. We cued up a tape, set the tuner's Display Format to Video, made sure the VCR was set to the right channel (you can check to make sure it's passing the signal through to the display), and started recording. The process works for SD and HD content alike, though you'll notice the most degradation in HD quality when converted to VHS.

Archiving shows to DVD is a similar process. If your DVD recorder accepts S-video, component, or even DVI inputs, connect the cables, set the LST-3410A to the appropriate output, make sure the signal is coming through, and record. You'll experience less image degradation with DVD, though DVD recordable media costs more than VHS tapes. ■



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Yamaha RX-V550 Receiver

Yamaha's newest receivers are all about pushing high-end features into the mainstream. The RX-V550, one of the newest rungs on the RX product ladder, doesn't benefit from as much trickle-down technology as its higher-priced cousins but still shows Yamaha's commitment to providing high-quality audio.

The RX-V550's 6.1-channel output supports Dolby Digital EX and DTS ES (Digital Theater System Extended Surround) standards. It lets you set crossover levels for routing LFEs (low frequency effects) to a subwoofer and includes 29 customizable surround modes. On the video side, Yamaha included S-Video upconversion and 1080i (interlaced)-compatible dual-switched component video jacks. Unfortunately, the RX-V550 doesn't include component video upconversion or Yamaha's YPAO (Yamaha Parametric Room Acoustic Optimizer) automatic acoustic configuration technology.

The RX-V550's Input scroll wheel is useful for switching among the model's seven inputs (CD, CD-R, Tuner, DVD, CBL, V-AUX, and VCR). Its physical controls are firm yet responsive, a sign of quality construction. You can easily access all of the receiver's major functions through the front panel. We're disappointed in the RX-V550's back-panel layout: stacking the inputs vertically means that bottom component jacks are virtually inaccessible unless you have completely open access to the receiver's back. The setup and configuration menu is fairly easy to handle, though, and the included remote is well-designed, even if it has an old-school look.

Yamaha has a reputation for creating strong, clear sound in affordable products. The RX-V550 is no exception, with 90 watts per channel rms (root mean square) and a mere 0.06% THD (total harmonic distortion) at 20Hz to 20KHz. And Yamaha lives up to those ratings. We tested the RX-V550 with several brands of

speakers playing a variety of movie, CD, and TV sources. Its sound was crisp, without distortion or artifacts at any volume level. We found the RX-V550 to be strong across all frequencies and all sources.

As you move beyond entry-level receivers, you'll often pay more for additional features rather than for better sound quality. But if you're looking for great sound, the RX-V550

will ring in your ears better than most receivers in its price range. ●

BY GREGORY ANDERSON



Yamaha RX-V550 Receiver

\$449.95

www.yamaha.com

Configure The RX-V550 For Your Room's Acoustics

A little time invested in system configuration can go a long way toward making the RX-V550 sound great in your room.

1. Basic Setup—Start with Yamaha's setup menu. Press Amp and then Menu on the remote control until Basic Setup appears in the display. Press Select and scroll through the options to define room size, subwoofer presence, and speaker configuration. After you make your choices, select the Test Tone to make sure everything sounds right.

2. Manual Setup—An even more detailed way you can adjust the receiver's acoustics is to manually set the Sound Menu. Scroll past the Basic Setup option (above) and choose Manual Setup instead. Configure the following:

Option	Purpose
Speaker Size (Large or Small)	Determine which frequency ranges go to which speakers
LFE Destination	Choose between a subwoofer and front speakers
Crossover Range	Select the level at which the receiver sends low frequencies to a subwoofer rather than regular speakers
Speaker Level	Define sound levels to account for distance between the speakers and listener
Speaker Distance	Account for audio delays caused by the distance between speakers
Center Graphic Equalizer	Match the center channel tone to left- and right-front loudspeakers
LFE Level	Adjust the power of bass signals
Dynamic Range	Determine the amount of compression
Audio Delay	Synchronize sound and video

3. Customizing Sound Fields—For even more detailed settings, change the parameters for specific DSP (digital signal processor) sound fields (such as Hall, Movie, or Jazz). On the remote, press Amp and select the button for the sound field to be modified. Press the remote's Up and Down arrows to scroll through options for the effect level, delay, or shape of the sound field. ■

Panasonic PT-AE500U

If you're ready for real home theater, turn your eyes to projectors. Not rear-projection televisions—real projectors. Even entry-level front projectors can provide high-definition images without a massive TV case at a price much lower than similarly sized flat-panel models. Panasonic's PT-AE500U is one such model. If you have the space and desire to set up a front-projection-based home theater, the PT-AE500U is a solid option.

The PT-AE500U is a high-definition (720p) widescreen model, with a 40- to 200-inch image size. Its 850 lumens and 1300:1 contrast ratio are respectable, though of limited use, as both brightness and contrast vary considerably based on the projector's throw distance and the room conditions. The projector includes DVI/HDCP (Digital Visual Interface/high-bandwidth digital content protection), component, composite, and S-Video inputs. There's just a single connector for each, so you may have to run multiple devices through an A/V receiver with automatic switching and/or upconversion.

Setting up a projector is a bit of a project, unless you're simply setting it on a table. Most do-it-yourselfers can manage a ceiling installation if they have a little patience, a few tools, and September's "A/V Project" article (See pages 26-29). Configuring the PT-AE500U is pretty simple: The menu system is straightforward and easy to navigate. Switching between desk or ceiling modes and front or back projection is a cinch. The unit doesn't support lens-shifting, however, requiring a low angle of projection or use of the keystone feature. **Lens shift** changes the actual angle of optical projection, preserving the original picture. **Keystoneing**, on the other hand, artificially reshapes the image, affecting picture quality.

The PT-AE500U creates a bright, clear image, even in daylight conditions. Ambient lighting is more of an issue with a projector than with a standard television, but this model handles the challenge well. The picture is sharp and lives up to its HD billing: Both standard

and high-definition content looks great. Color and black levels are good right out of the box and a little fine-tuning improves them even more. The Panasonic projector rendered the cancan scene in "Moulin Rouge," particularly challenging for its frenetic motion and brilliant colors, without distortion or edge artifacts when viewed at a proper distance (multiply the diagonal screen size by three).

The PT-AE500U is user-friendly and has all the functions most users need for big-screen high-definition

viewing. If you're ready to set up a small or medium home theater, but aren't ready to shell out several times the price of the Panasonic for a high-end plasma or LCD widescreen TV, the PT-AE500U is a satisfying substitute. ●

BY GREGORY ANDERSON

Panasonic PT-AE500U

\$2,499.95

www.panasonic.com



Front Projection Setup Tips

Setting up a front-projection home theater requires some handyman skill and calibration know-how. The following tips will help you set up a front-projection system properly.

Mount Up

Model-specific and universal ceiling mounts abound. Pick one that fits your projector and use it. Ceiling installations save space and help protect your expensive projector from terrestrial dangers.

Calibrate, Celebrate

Projected images are more sensitive to room and lighting conditions than other display types. So it's very important to calibrate projector pictures carefully. Do it yourself with a reference disc such as Digital Video Essentials (\$24.99; www.videoessentials.com) or AVIA: Guide To Home Theater (\$49.99; www.ovationsw.com/avia.html). You can also pay a local pro to set up and calibrate your system.

Consolidate Connections

Look for an A/V receiver with component and S-Video switching and upconversion. You can run separate cables to each of the projector's inputs, but it's better to stick with the best input connection that your home theater receiver can support, such as component video.

Avoid Keystoneing

Make sure your projector mount has an adjustable length so you can set the projector at an angle that avoids creating a trapezoidal picture. Keystoneing correction tools restore the rectangular shape but negatively affect image quality.

Keep Quiet And Cool

Front projectors can be a bit noisy if they're directly above the seating area. You can build a box around the projector to muffle the sound, but make sure to maintain plenty of ventilation. Like most consumer electronics equipment, your projector needs to breathe so it can stay cool. ■

Sonnet Technologies PodFreq

FM transmitters for the iPod have been around for nearly as long as the iPods themselves. Generally, they're clumsy with poor fidelity and usability. Yet, for iPod owners who desire to listen to their iTunes library in a car without using headphones, the transmitters have been the only alternative to cassette adapters and auxiliary inputs. But Sonnet's PodFreq (pronounced pod-freak) is not just another transmitter.

At \$99.95, the PodFreq is one of the most expensive FM transmitters designed for the iPod. Our experiences with iPod FM transmitters in the past have been less than stellar, but the PodFreq proved to be better than those pretenders.

At first glance, the PodFreq doesn't look that elaborate. Designed to encase your iPod in clear Plexiglas, the PodFreq has a hinged top that leaves the headphone plug and front controls accessible. Simply open the hinged top and slide in your iPod. Inside the PodFreq is an adapter that snugly attaches to your iPod's custom FireWire interface. This adapter is how the PodFreq draws both power and audio from your iPod.

On the back of the PodFreq is a simple 9-inch telescoping radio aerial, the kind you'd expect an inexpensive portable radio to use. A power button, an LCD screen, and two buttons for tuning the FM transmission frequency are at the bottom of the PodFreq. Two interfaces, mini USB 2.0 and FireWire, are neatly tucked into the side of the PodFreq for transferring both power and audio files to your iPod. Finally, there's a simple flip-out base that helps keep the PodFreq upright and stable.

To use the PodFreq, insert your iPod into the PodFreq case and power up the PodFreq by pressing the large power button. Next, tune your car stereo to an unused FM frequency. When you find a clear frequency, tune the PodFreq to the same frequency via the tuner buttons. You can tune the PodFreq from 88.3 to 107.7MHz, and Sonnet claims it has a range of 10 to 35 feet.

We used the PodFreq for a few weeks, and several things stood out. First, the PodFreq is the best FM transmitter for the iPod in terms of both usability and performance. With dedicated controls for switching the frequency, the PodFreq was easier to use than other FM devices that use an iPod's own navigation menu for FM tuning.

Second, the PodFreq requires you to give up some of the best aspects of the iPod: the Dock and the iPod's small size. Although you can use the PodFreq as a dock by connecting it to a FireWire or USB cable, it's simply not as elegant a system as the

iPod's native dock. In addition, the PodFreq adds significantly to the size of the iPod. An iPod can be easily tucked into a shirt or trouser pocket, but the PodFreq makes it too bulky to do so comfortably.

In terms of audio fidelity, the PodFreq did a respectable job of playing FM stereo sound. To get the best results, we extended the PodFreq's antenna and chose FM frequencies that were far from established radio stations. If your stereo doesn't have a cassette deck or auxiliary inputs, the Pod-Freq is the best way to listen to your iPod collection through a radio. ●

BY CHRIS JACKSON



Sonnet Technologies PodFreq

\$99.95

www.podfreq.com

Manage Your Expectations

Although the PodFreq worked as advertised, we couldn't help but notice that compared to other connection methods, such as a direct audio cable from the iPod into a car stereo's auxiliary port, the PodFreq left a lot to be desired. Yes, there were no extra wires or cables left dangling around our car. However, the audio fidelity of the PodFreq is substantially lower than that of auxiliary inputs or even a simple cassette adapter.

We also couldn't turn up the volume to as high a level as we'd have liked. Instead, we had to boost the sound level via the car radio, and this increased the distortion and lowered the signal to noise ratio.

One unfortunate side effect of the PodFreq is the need to constantly switch to an unused FM frequency. For home users, this isn't a significant problem, but for commuters and cross-country travelers, it can be an annoyance. Just when you find a clear frequency, you climb a hill and discover that a talk radio show is using that frequency. After awhile, it becomes tedious to keep searching and switching to unused frequencies.

We were able to achieve the best performance with the PodFreq by selecting a frequency with no active stations adjacent to it. We also found that the antenna was not quite omni-directional. We could often obtain a better signal by trying to aim the antenna in different directions. Extending the antenna also boosted the signal strength, although it made the iPod/PodFreq combination a bit unwieldy. ■

Notebooks



IBM

\$1599.00

ThinkPad T42 2378-DUU
Pentium M 1.5 GHz 14.1" TFT
256MB RAM 40GB HD WinXP Pro



acer

\$929.00

Aspire 1355LC Mobile AMD
15.0" TFT 512MB RAM 40GB HD



SONY

\$1889.00

VAIO TR3A Pentium M 1.0 GHz
10.6" TFT 512MB RAM 40GB HD

Networking



NETGEAR

\$59.99

WGR614 54Mbps Cable/DSL
Wireless Router IEEE 802.11g



D-Link

\$69.99

AirPlus G DI-514 2.4GHz
4-Port 802.11g Wireless Router



LINKSYS

\$79.99

WRT54G 54Mbps Wireless G
Broadband Router

Video Cards



GIGABYTE

\$199.00

GV-NX59128D nVidia
GeForce PCX 5900 128MB DDR
256-Bit PCI-Express x16



MSI

\$185.00

ATI RX9800PRO 128MB DDR
256-Bit DVI/S-Video 8x AGP



eVGA

\$269.00

nVidia GeForce 6800 128MB DDR
256-Bit Model# 128-A8-N343-AX

Hard Drives



Western Digital

\$260.00

250GB External Hard Drive
Dual-option Backup USB 2.0 &
FireWire Model# WDXB2500JBRNN



Maxtor

\$189.99

250GB 7200RPM SATA 8MB
Buffer Model# 7Y250MO - OEM



SAMSUNG

\$85.99

40GB 5400RPM Notebook HD
Model# MP0402H - OEM

Cases



Antec

\$120.00

P-160WF Silver Aluminum
Performance 1 ATX Mid-Tower w/ Side
Window Panel & Front LED Display



TURBO CASE

X-Infinity
ATX Mid-Tower
350W Power Supply

\$66.00



RAIDMAX

668WBP
Aluminum Gaming
Case w/ 420W
Power Supply

\$96.00

Memory



crucial

\$85.00

512MB PC-3200 184 Pin DDR
SDRAM Model# CT464Z40B.8T - OEM



Mushkin Enhanced

\$78.00

Basic Green PC-2700 512MB
184 Pin DDR Model# 990962



CORSAIR

\$135.00

XMS Extreme PC-3200C2PT
512MB 184 Pin DDR SDRAM - OEM

- 98% of orders ship within 1 business day
- 97,000+ product reviews from customers
- 9,000+ customer testimonials
- "A" rating on ANY merchant ranking site

Free Shipping* >> FedEx Express Saver Shipping



Best Place to Buy Components

Griffin Technology iTrip mini



Griffin Technology iTrip mini

\$39.99

www.griffintechology.com

just a small red LED that indicates it's in use.

Matching the design of the iTrip mini to the iPod mini was clearly important to the engineers at Griffin Technology, and the iTrip mini helps maintain the popular audio player's most endearing trait: its small size. The iPod mini is only 3 inches long, and the iTrip mini only adds an inch to its overall length. The iTrip mini doesn't add any significant weight to the iPod mini either, as it draws its power through the iPod's headphone jack instead of requiring its own batteries.

We also didn't notice any significant decrease in the lifespan of our iPod mini's battery when using the iTrip mini. We routinely use our iPod mini for up to eight hours without a recharge and our experiences with the iTrip mini matched this. We also found

the range of the iTrip mini to be in line with Griffin's estimate of 10 to 30 feet. Because the iTrip mini has a small built-in antenna, we noticed it was a bit more sensitive than other FM transmitters to positioning.

Although FM broadcasts can't deliver CD quality audio, the iTrip mini did a respectable job. Like many FM transmitters, the iTrip mini can't output high sound levels without introducing significant amounts of distortion. Griffin recommends setting the iPod's volume between 50% and 70% to achieve the best results, and our real-world tests matched this advice.

Our biggest gripes with the iTrip mini were the result of a desire to have our cake and eat it too. Tuning to alternate stations to receive the iTrip mini's transmission was tedious, and not recommended while driving. We also missed using the headphone jack. Because the iTrip occupies the iPod mini's headphone jack, you have to remove it if you wish to use headphones. Despite this, we found the iTrip mini to be a perfect complement to our favorite music player. ●

BY CHRIS JACKSON

When Apple introduced the iPod mini, aftermarket iPod accessory makers had to scramble to match their peripherals with the new iPod's layout. Among the more successful of these aftermarket vendors is Griffin Technologies, with the iTrip mini.

Designed to add FM broadcast capability to your iPod mini, the iTrip mini is a well-designed addition that blends seamlessly with the diminutive iPod mini. Molded out of a neutral white plastic, the iTrip mini sits atop your iPod mini and matches its contours.

Another key design decision was to utilize the iPod mini's own menu to tune the FM transmitter. This is a minimalist's dream. The iTrip has no buttons or controls to blemish its design,

Tuning Troubles

When we first attempted to use the iTrip mini, we were completely unsuccessful. We could never make the iTrip mini broadcast on any frequency other than the default 87.9MHz, which was occupied in our area. Eventually we completely deleted the iTrip stations from iTunes and reinstalled them from the CD that came with the iTrip mini.

Next we synced our iPod mini with the new iTrip stations via iTunes and then reset the iPod mini. This entailed depressing both the Menu and Select buttons until the Apple logo appeared. Once the iPod had restarted, we were able to swap stations with ease.

Our next difficulty came in finding free FM frequencies in our area. It seemed like every time we settled on one, we'd drive a mile and find that frequency in use. After a few days of frustration, we discovered the iTrip Station Finder on Griffin's Web site. Using it was simply a matter of clicking our state and then selecting our city. The Station Finder displayed a list of unused frequencies, and we found it to be a relatively accurate listing. It also includes a way for users to submit open frequencies to the Station Finder database. ■

Apple AirPort Express

Apple's knack for designing intriguing hardware knows few bounds, as shown by its new AirPort Express. Bundled into its compact dimensions is a 802.11g wireless access point, a wireless USB print server, and a music server with the appropriate moniker: iTunes.

Approximately the size of a deck of cards, the AirPort Express is aimed at college students wanting to "unwire" their dorm rooms, business travelers who connect to the Internet in their hotel rooms, and consumers looking for the finishing touches on their home network. With a retail price of \$129, the AirPort Express is an outstanding value.

The AirPort Express is designed to plug directly into a power outlet and weighs in at only 6.7 ounces. It features a 100Mb (megabit) Ethernet interface includes a USB port to use the AirPort Express as a print server. Two stereo outputs (analog and digital) round out the AirPort Express's interfaces.

If you currently have a wired Ethernet network, the AirPort Express is an affordable way to add wireless support for laptops and other devices that support 802.11g and b signals. The AirPort Express uses the 802.11g wireless protocol, capable of transferring data at speeds of up to 54Mbps (megabits per second). Reaching this transfer rate depends on how far your PC is from the AirPort Express. Apple claims that you can achieve 54Mbps up to 50 feet away from the AirPort Express, and our experiences were in line with this assertion. When we moved past 75 feet, the drop in signal strength lowered the performance to less than 11Mbps.

You can also use the AirPort Express to extend the range of an already existing AirPort Extreme wireless network by acting as a "bridge" between the other wireless devices on your network. In theory, you can link a series of AirPort Express base stations to provide a wide coverage area with high-speed connections.

Mobility is another valuable asset of the AirPort Express. If you need to create an ad-hoc wireless network, the AirPort Express makes it easy. Simply plug it into an outlet, connect it to an Ethernet connection, and you're un-wired. When you're done, tuck the AirPort Express into your pocket or briefcase. There's no external power supply to struggle with, just a flip-down AC plug.

In addition to being an excellent wireless access point, the AirPort Express packs a powerful software package as well; iTunes. iTunes lets you play your music collection over your wireless network using Apple's popular iTunes music software. iTunes automatically detects an AirPort Express base station and broadcasts your music



Apple AirPort Express

\$129

www.apple.com

to it. Simply connect your base station to your stereo and you have instant access to your entire iTunes music collection.

Apple knows that no computer is an island, which is why the AirPort Express was designed to work with both Windows and Mac-based systems. The AirPort Express is also an excellent bargain because of its built-in print server and media streaming ability, so you won't have to buy extra hardware for those purposes. You'll be hard-pressed to find another wireless access point that is this versatile for any-

where near this price. ●

BY CHRIS JACKSON

Secure Your Network

An unprotected wireless network exposes your computer to eavesdroppers and freeloaders, so take a few precautions to protect yourself. The AirPort Express utilizes two technologies to help you secure your wireless network: WPA (Wi-Fi Protected Access) and a firewall.

WPA is the successor to WEP (wired equivalent privacy). WEP was one of the first attempts by wireless equipment manufacturers to provide a level of protection to wireless networks. Unfortunately, WEP proved vulnerable to a series of attacks.

It's easy to configure the AirPort Express to use WPA. As long as you're using a Wi-Fi certified network card and either OSX, Windows 2000, or Windows XP, you can use WPA to protect your network. First, launch the AirPort Admin Utility. Select the AirPort tab and click Change Wireless Security. Select WPA Personal from the drop-down menu and type a password into the Password field. Choose a password that isn't easily guessed and then repeat it in the Verify Password field. Click OK and you've enable WPA on the base station.

The AirPort Express also includes a basic firewall to protect against attacks coming from the Internet. Whenever you configure the AirPort Express to share an Internet connection, it automatically enables its firewall. ■

CE Face-Off

Flash MP3 Players (\$150 To \$300)

One minute of stereo audio in CD quality requires around 10MB of storage. But with MP3 encoders and still newer compression standards such as WMA (Windows Media Audio) and AAC (Advanced Audio Coding, used by Apple's iTunes), we can squeeze a digital recording into a tenth of its original uncompressed size, or even smaller, with little or no discernable loss of fidelity.

You probably know the rest of the story: MP3s begat music downloading (legal and illegal), which begat online digital music stores and an entire sub-industry of software and hardware catering to our love of these space-efficient little files.

Stick It In Your Ear

Portable digital music players are a quantum leap beyond earlier generations of cassette and CD players. They combine playback and large storage capacity in a unit that fits in the palm of your hand. There are two general categories of players: those that use tiny hard drives and those that use flash

memory. You can listen to both kinds of players through a set of included earbuds, but the differences between them are significant.

Flash memory, also known as non-volatile memory, can retain data indefinitely without requiring electricity. In contrast to hard drives and floppy diskettes, flash memory has no moving parts. If you'll pardon the plunge into alphabet soup, it's a type of **EEPROM**, (electrically erasable programmable read-only memory), in which data are programmed and erased in blocks rather than individual bytes. If you've ever used a digital camera that stores images on memory cards, then you've already seen flash memory in action.

When comparing the two main types of digital music players, on the surface it may seem that hard drive players, with storage capacities routinely measured in gigabytes, are better bargains than flash players, which often top out at 256MB or 512MB of memory. Depending on your needs, that may be true.

Why, then, consider a flash player? For starters, to repeat, the playback mechanism has no moving parts. Hard

drives, which do, are destined to fail eventually. This may not happen for many years, but for some it happens sooner. No moving parts also means that flash players are impervious to the shocks and jolts of vigorous activity—running, gym workouts, etc.—that hard drive players might be more sensitive to.

Then there's the matter of powering the unit. Last year, Apple had a public relations mess on its hands when it came out that many of the rechargeable lithium-ion batteries in its iPods were dying after about 18 months. Because these batteries were not easily user-replaceable, getting the affected iPods operable again wasn't cheap, costing, in some early cases, nearly as much as a new player. Most flash players run off a single cheap AAA or AA alkaline battery, supplying, typically, between 14 and 30 (or more) hours of use.

Unless you have a need to consolidate your digital music collection in a portable hard drive, a flash player may be the way to go. It doesn't take long to rotate in new material from your computer, and a flash player will still hold hours' worth of tunes. For MP3s encoded at the 128Kbps (kilobits per second) quality level, a 256MB player will hold the equivalent of about four CDs; double that for a 512MB player. If your music is encoded in the WMA format, a more efficient compression standard, you can squeeze even more material into the same space.

We took a look at six flash players with a variety of features and accessories. All play MP3s and WMAs and support ID tags that contain information about your audio tracks. In addition to general listening, we evaluated each player using the same playlist that encompassed a variety of acoustic and electronic material. We put the players through their mobile paces, too, taking them into the gym for workouts and, accessories permitting, hitting the road for 3-mile runs.

All prices are MSRP, but be aware that digital audio player prices seem particularly volatile lately. Some list prices dropped during our evaluation time frame, and some reflect discounts

Cowon Systems
iAudio 4 (512MB)



that, as of when we went to press, had yet to be adjusted on the manufacturers' Web sites.

Cowon Systems iAudio 4 (512MB)

\$249

www.jetaudio.com

If the names are unfamiliar, Cowon Systems is a South Korean company, JetAudio is its American outlet, and judging by this player, it really knows what it's doing.

The iAudio 4 is about the size and shape of a butane lighter. The front is dominated by the LCD, and the edges bristle with buttons, some of which are so tiny you may find it easier to press them with the edge of your fingernail. It's a little powerhouse, though, supplementing MP3/WMA playback with a clear-sounding FM radio tuner and a voice recorder for memos and blackmail. It also has a stereo minijack for line-in recording/encoding direct from sources as portable CD players.

The iAudio 4 connects to your computer with your choice of USB cable or a special adapter plug. The unit is cross-platform (the flash drive itself is plug-and-play, so you can use it to hold any data) but leans more toward the PC side by including the Windows-only JetShell manager program. You can use this to interface with the player, copy over files and folders, edit ID tags, and more. On Macs, you can simply create folders and

Optimize The Sound Of The Cowon iAudio 4

The iAudio 4 has no fewer than five tools for tweaking the audio quality of your music. You can use them separately or in any combination.

To access these settings while a song is the active display item, give the Menu button a quick press (press-and-hold calls up the folder playlist). The top item in the menu list is JetEffect, the group heading for sound enhancement items. Press the Menu button again to slide laterally into the enhancers and use the plus (+) and minus (–) buttons to scroll up and down the list. Press Menu to access a selected item. Then use the plus

and minus buttons to set that item's values.

Equalizer. Here you can choose among seven presets: Normal (no adjustment), Rock, Jazz, Classical, Pop, Vocal, or User. To customize your own User settings, press the arrow buttons to move among the five frequency bands.

BBE. This is a licensed technology that gives audio increased sparkle and definition. For more information, visit www.bbesound.com or see our May 2004 issue where we ran a "Sights & Sounds" column on BBE Sound. Although it can be set as high as 10 here, 4 or 5 is usually sufficient.

Mach3Bass. Another BBE technology, this deepens bass. Set to taste between 1 and 10. We find that 7 or 8 shores up the low end without overpowering the highs.

MP Enhance. A simple on/off setting, this seeks to restore the sonic warmth that is sometimes lost when music files are compressed. We prefer it on.

3D Surround. This lends music a sense of spaciousness by giving it a reverberant quality. We find that the middle values, around 5, enhance the sound without muddling it.

The JetEffect menu also has a Pan control, which is a simple left/right balance. ■

drag-and-drop files directly in the flash volume, and the player will recognize each folder as a separate playlist.

We tested all six players for how quickly they would load the same 68-minute CDs' worth of MP3s—14 tracks encoded at 160Kbps quality, totaling 77.8MB. The iAudio supports the USB

1.1 standard only and took 1:55 (minutes: seconds) for loading.

Once loaded, the music files sound terrific. The player has a variety of sonic enhancement features, including BBE Sound's High Definition and Mach3Bass, two technologies licensed from a pioneer in audio enrichment. These and other controls really can make music sparkle, fortifying the frequency spectrum to give weight to everything from crashing Rachmaninoff piano chords to double-kick-drum barrages.

The iAudio 4's accessories include a carrying sleeve and armband. There's no neck cord, although the player has an eyelet for one. Our only gripe with the entire package is the earbuds. They sound fine; they just don't fit very well. To an extent, this is a meaningless criterion because everyone's ears are different. Still, unlike all the other earbuds, this pair's stems are squared off like little mallets instead of being contoured, and they seem abnormally big.



Creative NOMAD
MuVo TX (512MB)

We never could get them to feel well-seated in our ears.

Creative NOMAD MuVo TX (512MB)

\$249.99

us.creative.com

Creative has earned a permanent place in computer history for its SoundBlaster line of PC sound cards. One in a line of several players, the NOMAD MuVo TX is similar in size and dimensions to the iAudio 4 but has a two-piece design. Its flash drive slides out of the battery chassis and plugs directly into a USB jack, so you can use it for shuttling other data between computers. It supports USB 2.0 and is a fast loader. Our test album took just 29 seconds to transfer.

Its design makes it cross-platform-compatible. Windows users can use the included Creative Media Source program for track management. Mac users get nothing but need nothing. As with the iAudio 4, you can work directly with the flash drive.

The MuVo TX also does double-duty as a voice recorder, although we found it fiddly to operate. First, it was reluctant to record as described; then, once we got it to work, it was so reluctant to play that it required a quick shutdown and restart.

But as a music player, it performed without a hitch. It consolidates control in just four buttons: one for On/Off/Play/Pause; dedicated Volume Up/Down buttons; and for everything else, a combination wheel-button—thumb it from side to side to scroll through menus or song titles and click it to select an option. The two-line display is tiny but does the job. The MuVo comes with a neck cord, and we found the ear buds to sound full and bright even without using any of the four EQ presets.

iRiver iFP-895 (512MB)

\$279.99

www.iriveramerica.com

iRiver is one of the giants of portable music, with five series of flash players currently available, each of which has up to four storage capacity options. The

iRiver iFP-895 (512MB)



iFP-895 is from one of the higher-end lines and feels impressively sturdy in the hand. With its triangular shape, it can rest on a desktop with its display angled in clear view.

Like the iAudio 4, this one also features line-in recording, a voice recorder, and an FM radio. For music loading, PCs and Macs alike need the iRiver Music Manager program, although the Windows version has considerably more features. For both, the program also lets you set FM tuner presets and check for firmware upgrades. The Windows version has an image viewer, so yes, you can use the drive for other data, but unlike the iAudio 4, it requires the software interface for access. The unit connects via a USB cable; even though it supports the 2.0 standard, its speed was still pokey, with our test album taking 1:45 to load.

The iFP-895's navigation and control are divided among a joystick and three buttons, all of which have a great tactile feel—a good thing because, as on the iAudio 4, there's a lot to control here. Among the dozens of menu options are sound enrichments that go beyond a simple EQ, including a 3D option for extra spaciousness and DBE (Dynamic Bass Enhancement). There's even an alarm clock and a timer for recording FM radio. The iFP-895 comes with a full assortment of carrying accessories: a neck cord and a sleeve that will fit a belt or the included armband.

Even though the iFP-895 is extremely well-thought-out and full-featured and

performed flawlessly, it does have one foible that we disliked: Music file transfer is one-way only. You can upload music files, but if you try transferring one from the unit to your computer, the Manager program refuses to cooperate, citing copy protection issues. But it uses no discrimination whatsoever, regarding everything as copy protected . . . even material freely and legally acquired years ago from unsigned artists at MP3.com and other sites.

Lexar Media JumpGear MP3 (512MB)

\$189.98

(\$49.99 player + \$139.99 drive)

www.lexarmedia.com

Lexar is best known for its variety of flash drives and memory cards in just about every format around. Judging by this player, Lexar should stick with what it does best.

The two-piece design is similar in principle to Creative's MuVo TX, but in this case you can buy the player separately to use with Lexar's rugged JumpDrive Sport flash drive. Because the USB 2.0 drive merely plugs into the player shell, you can use the drive for other purposes, as well. It's certainly a no-frills arrangement—no carrying accessories and no software, although on a PC you can use Windows Media Player to load songs. It's just as simple to drag and drop.

We could tell you more, but why bother? The JumpGear's performance was clunky at best. During general operation, the controls didn't always behave

the way the manual described, leaving us to find out just what did work for some playback and navigation functions. The LCD display looks amateurish. Worse, for reasons we could never figure out, the player seemed to think that two copies of certain songs were onboard, rather than just one; when it couldn't find the second, playback simply stopped.

Unless you thrive on frustration, this is one player to avoid.

Philips Key014 (256MB)

\$149.99

www.philips.com

Wildly innovative, or just plain weird? You be the judge. Philips calls

Lexar Media JumpGear
MP3 (512MB)



the Philips Key014 a "wearable" audio player, and it means it. Not only is the included neck cord the only option for

carrying the unit, the cord is essential to its operation.

The player plugs into a thick plastic disk at the bottom of the cord; here you'll find the On/Off/Play/Pause switch. There's another plug at the cord's opposite end at the back of your neck; this is for the earbuds. And in between, the cord itself is wired, with sensors for volume control and forward/backward navigation arrows. In other words, the Key014 has just one moving part! It works amazingly well, although using the cord sensors can take a little getting used to. Skipping between adjacent tracks only takes a quick little squeeze; hold the squeeze, and you go into SuperSkip mode, leaping over multiple tracks.

As innovative as this control method is, it isn't suitable for deeper functions. In contrast to the other units, there's no menu for adjusting the display backlight, applying EQ presets or customizing your own, setting repeat or shuffle modes, etc. It plays, it stops, and that's it. And while it generally sounded quite good throughout our range of test material, we missed having an EQ to beef up a couple tracks that sounded thin.

For computer connection, pop off the Key014's end cap, and you'll reveal a USB 1.1 jack. Our test album loaded in 1:57, and, of course, you can use the drive for other data. In another feature unique to the Key014, the USB connection feeds a built-in rechargeable battery. If you'd rather use an alkaline AAA battery, leave off the end cap and instead attach the separate battery module.

Most-Wanted Features

Developers such as music players should deliver a maximum of enjoyment with a minimum of fuss. None of our players had every feature listed below, but three out of four isn't bad.

High-speed connection. We all love USB connections that put the Universal in Universal Serial Bus. But the older, slower USB 1.1 standard is suitable mainly for keyboards, mice, and transferring small quantities of data. If you start porting several CDs' worth of tunes over a USB 1.1 connection (up to 12Mbps), you'll have enough time on your hands to head to the kitchen to brew a leisurely cup of caffeine. USB 2.0, on the other hand, with speeds up to 480Mbps, will get you finished and on the move much faster.

EQ and beyond. Considering how tiny the speakers in earbuds are, it's a wonder they sound as full as they do. Still, they sometimes need a boost to sound their best. At minimum, a player should have an equalizer with a handful of presets, plus the option to create your own custom setting. And if the player also features more sophisticated sonic enhancers, as do the Cowon iAudio 4 and iRiver iFP-895, so much the better.

Ample carrying options. "1,000 songs in your pocket," was the ad tagline for the original Apple iPod. But your pocket isn't the only place you can stow your player, and portability options shouldn't come at a premium. We're impressed when the full array of a neck cord, an armband, and a sleeve that fits the

armband or your belt come as standard, not optional, accessories.

Data transfer double duty. Flash memory doesn't care what it records. It's as happy to store big graphics files or your email archive as it is MP3s. A flash device that easily moves from one USB port to another is often the simplest way of transferring data between computers. Most of the units here can accept whatever data you want to send them. However, if a device (such as the iRiver iFP-895) requires a driver or software interface to be recognized, the receiving computer won't automatically be able to access that data. But a plug-and-play unit (such as the iAudio 4) or a detachable flash drive should show up on any USB-equipped computer as a new external drive. ■

On PCs and Macs alike, you can arrange folders of music directly on the flash drive. PC users also have the option of using the included Musicmatch Jukebox software.

Rio Cali (256MB)

\$149

www.rioaudio.com

With its rounded shape and rubberized grip, the Cali looks like a stopwatch, which is appropriate because it has a stopwatch onboard, accurate to 0.01 of a second and capable of remembering multiple lap times. It also has an FM radio tuner.

This is definitely the player of choice for the sporting life. It comes with a tough elastic and Velcro armband carrier (no neck cord, unfortunately) and has our roundup's most secure earbuds. Rather than simply popping into the ear canal, they have soft rubber loops that comfortably fit around the tops of your ears. During a 3-mile run, we experienced only



Rio Cali (256MB)

a couple of gradual slips. Standard earbuds are fine for low-impact workouts such as weightlifting, biking, and rowing machines. But for runners, standard earbuds just don't stay in place for long unless you're wearing a stocking cap—hardly a year-round solution.

The Cali connects to your computer via USB 1.1 cable. Our test album took a sluggish 3:17 to load. On PCs, you can manage playlists and rip/encode (but only in the WMA format) with the included Rio Music Manager software, as well as a RealOne Player. On Macs, the Cali works with iTunes, although it's somewhat handicapped by an inability to retain playlists; all songs show up in one long root-level list.

Even so, the Cali's navigation and operation are smooth, swift, and simple, thanks to a stubby red joystick. The display is the largest of the group, and you can press the joystick to cycle through multiple views. A rocker switch handles the player's volume. And if 256MB of built-in flash memory isn't enough, the Cali is expandable, accepting an SD (Secure

Digital) card or MMC (MultiMedia-Card) up to 512MB.

Lend Us Your Ears

If you're the type of person for whom life must have a soundtrack, all of these units, the Lexar excepted, can keep you happily inundated in theme songs. Creative's MuVo TX is fast and simple, the Rio Cali lends itself best to vigorous activity, and Philip's Key014 wins points for sheer innovation.

But our pick comes down to Cowon's iAudio 4 and iRiver's iFP-895. They're both jam-packed with features and give you the most control over sound. Yet each has a drawback significant enough to keep it from being a slam-dunk: the iAudio's iffy earbuds and the iRiver's one-way restriction on music transfer.

Still, the iAudio 4 takes top honors. You can always replace the earbuds, but you can't convince iRiver to stop suspecting you of having criminal tendencies. The iAudio's plug-and-play simplicity also gives it the edge on using it for data transfer. And the fact that it lists for \$31 less doesn't hurt either. **CE**

BY BRIAN HODGE



Philips
Key014
(256MB)



InterVideo WinDVD 6 Gold

InterVideo's WinDVD series is the company's popular line of DVD applications for personal computing. Not only do the programs offer a variety of playback options, making them one-stop multimedia shops, they're also user-friendly and inexpensive. We checked out the WinDVD 6 Gold version. A Platinum version is also available for \$20 more.

First and foremost, WinDVD 6 is about DVD viewing. Even with a DVD-ROM, DVD-RAM, or DVD±R/RW drive in your PC, you can't actually view DVD movies without special software that can decode commercial DVD signals. Enter WinDVD. InterVideo also includes MP3, QuickTime, RealPlayer, Windows Media files, VCD (Video CD), and audio CD playback. Audio features include support for Dolby audio formats and DSP (digital signal processor) audio effects.

In addition to standard playback, WinDVD adds a variety of handy user tools. One is Smooth Reverse Playback, which, as the name implies, improves the picture when you're rewinding. More useful, Quick Clips lets you record 30-second snippets of video for sharing or

storage. The Capture tool grabs screen shots with one click. My Playback creates playlists of video or audio files, and bookmarks save a location during a movie to help you find your place later. And, for mobile users, InterVideo's MobileTechnology and Timestretching options help preserve battery life and speed up playback.

We inserted a DVD on our Windows XP system after we installed the program, and the auto-prompt offered to launch the move in WinDVD. We went to the disc menu and began watching the film without any further ado. In Normal view mode, options to load new media are placed at the top left. And you can easily access action items (Zoom, Quick Clip, Capture, Bookmark) on the right. The program's playback controls are in a dockable panel along the bottom, but you can detach them and drag them anywhere on the screen. Full-screen mode puts away all those options and dedicates your display to the task at hand: watching a movie. Right-click the main screen to access more extensive disc options (and WinDVD's Setup menu). We thought it odd to leave out a more standard menu bar option, but right-clicking isn't exactly difficult. The Setup menu offers configuration for video and audio settings,

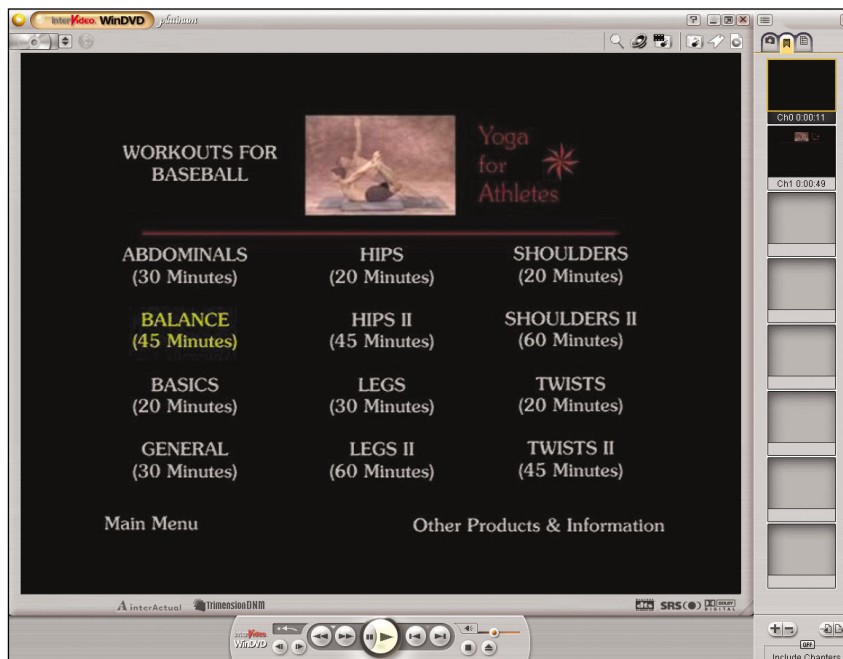
parental controls, and power settings. You can even switch among DVD Regions if you're traveling or want to check out the latest Bollywood import.

WinDVD's interface is, for the most part, attractive and intuitive. Playlists aren't as easy to manage as we'd like, especially for digital audio files, but the Quick Clip and Capture tools are nice for capturing small pieces of video. We especially liked the Video Desktop view for watching while you work. It replaces the Windows Desktop with the video source so you can work in other windows while keeping an eye on the show in the background. Audio CD playback is equally easy. Just insert the disc and go, using all the standard controls available to any audio player. And we appreciated the preponderance of keyboard shortcuts. It will take some time to learn them all, but hitting a shortcut to access the menu or to fast-forward sure is helpful.

The program's image and sound quality are acceptable, though subject to your computer's capabilities. With plenty of system memory and a sufficiently speedy CPU and graphics adapter, WinDVD will deliver steady and clear playback. Detailed video and audio controls, such as hue, color intensity, widescreen mode, and equalizers, let you tailor the program to your own system.

Watching DVDs on a computer isn't without its drawbacks, screen size chief among them (especially with the plummeting cost of standalone DVD players). But software tools such as WinDVD add value beyond pure decoding and create advantages to PC-based DVD viewing. You can exercise greater control over playback and archiving, consolidate your multimedia applications, and enjoy high-quality playback with WinDVD. If you're going to watch DVDs from your computer, this package is the way to go. ■

BY GREGORY ANDERSON



InterVideo WinDVD 6 Gold
\$49.95
www.intervideo.com

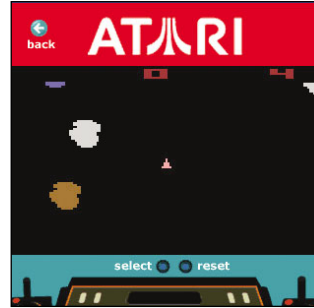
Atari Retro

You know a game platform has arrived when companies start rolling out throwback editions of classic games for the new setup. MDM's Atari Retro brings seven classic arcade games to your SD (Secure Digital) card-compatible Palm OS or Pocket PC PDA, or Nokia handheld device. It's a fun diversion for re-creating that '80s feel.

Atari Retro includes seven all-time favorites on a single SD card: Asteroids, Centipede, Breakout, Pong, Adventure, Yar's Revenge, and Missile Command. The directional pad (on Palm OS and Pocket PC devices) or numerical keypad (for certain phones) acts as game controller and option buttons. Palm OS users also need the stylus to select nonplaying options such as Reset and Mode Select and to navigate the Launch screen and game options.

The program is incredibly easy to use. Just insert the SD card into your SD slot. Atari Retro launches automatically, though you can access the card's menu to load the application at any time. The Launch Screen displays an icon for each game. Just tap to choose. An information screen provides easy access to game options (Difficulty, Sound, Help). After beginning a new game, you'll see a mock-up of the Atari 2600 console and a pair of joysticks along the bottom of the screen. It's a nice reminiscence but unfortunately takes up precious screen real estate.

The quality of gameplay will vary somewhat with your device. We tried the games on a PalmOne Treo 600. Directional pads aren't generally as responsive as joysticks, and your handheld's screen is no match for even the



Atari Retro
\$29.99
www.goMDM.com

lamest early '80s television. Of course, the graphics are as blocky and awkward as ever, but that's part of the charm. In keeping with

tradition, there's no saving of high scores or settings, though it would have been a nice addition.

Atari Retro is a set of nostalgic games well-suited to the simplicity of a handheld. But even the most robust mobile device won't do these games true justice. Nevertheless, if you grew up with Atari and like to kill time with your handheld, you won't go wrong with this affordable jog down memory lane. ■

BY GREGORY ANDERSON

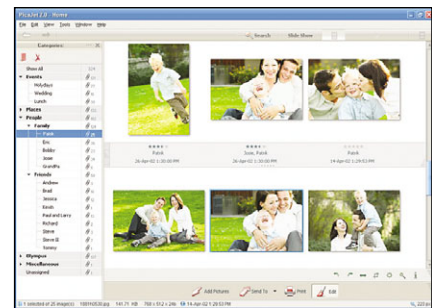
PicaJet 2.0

Like aftershocks following an earthquake, cottage industries are springing up in digital photography's wake. One category comprises digital photo albums. PicaJet's latest photo album software serves that purpose well.

Unlike many other digital imaging programs, PicaJet focuses on doing one thing and doing it well. Its features reflect that focus—narrow but clearly defined. Primarily, PicaJet makes it easy to import and catalog pictures. You can import files from cameras, memory cards, folders, CDs, or scanners, or you can browse thumbnails to view, find, edit, and share images. The program's image-editing options are limited (Rotate, Crop, Flip, Brightness, Contrast) but sufficient for spiffing up your snapshots. PicaJet's sharing tools include one-click emailing and Web gallery creation.

You can easily configure PicaJet, and the program has sufficient options for power users. You can create several albums, each with its own database for managing different types of files. Other options let you define thumbnail appearance and email settings. Best of all, PicaJet's shell integration puts a PicaJet option on the right-click context menu throughout Windows, letting you import images anytime.

PicaJet 2.0 is very well-designed. When importing files, you can automatically generate categories based on folder names, preserving your existing organizational structure. Add or search metadata for each file, including photo and import dates, ratings, categories, size, and EXIF (Exchangeable Image File) data. Browse the center thumbnail panel and double-click each image for a larger view. The program's email sharing integrates with your existing email client. Quick Edit functions are just a right-click away. And the one-click slideshow lets you scroll through pictures, adjusting settings on the fly.



PicaJet 2.0
\$29.95
www.picajet.com

PicaJet's focus is organizing image files, and it's one of the best applications we've seen for that purpose. If integrating lots of photo-related activities is equally important, PicaJet may not have all that you're looking for. But if you have a large photo collection and just need an efficient way to manage it, PicaJet is worth every penny. ■

BY GREGORY ANDERSON

Introducing the World's First **Firewire Flash Drive**



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Microsoft Optical Mouse By S+ARCK

Philippe Starck, or S+ARCK as he affects, is one of those artsy types who enjoys redefining our concepts of chairs and such (www.objectsby.com). The real head slapper is that he has a day gig, too. Besides guiding LaCie's hand when it comes to design of external storage, S±ARCK also helped Microsoft design these sweetly subtle optical mice. For just \$34.95, you can upgrade to a mouse with a glowing blue or orange strip of pure S±ARCK magic. And even though it doesn't show up well in the photo, S±ARCK threw functionality a bone in the form of a scroll wheel (www.microsoft.com).



Roomba Discovery

You know you want one.

Everybody does. This update of the original automatic floor-vacuuming robot is an improvement in lots of ways (\$249; www.irobot.com). It has a longer battery life for up to two hours of cleaning. When it runs low, it will automatically find its home base and recharge itself, usually in less than three hours. The Discovery is a more powerful cleaner than the original Roomba and has a bigger dustbin. Heck, it even has dirt-sensing technology. Its companion, the Roomba Red (\$149), is an entry-level unit that nevertheless incorporates the new Dirt Detect feature.

Trust us, it won't take your longhaired Persian too long to learn not to fall asleep on the floor.



Left-Handed FrogPad

Some folks just gotta be different. These freewheeling bohemians buy alternative keyboards. We're not talking about the split, ergonomic style that's otherwise the same old QWERTY layout—we're talking alternative. As in tiny. As in left-handed. As in the new Left-Handed FrogPad (\$169.99; www.frogpad.com). Just 5.5 x 3.5 inches and about half an inch thick, the FrogPad can fit where normal boards can't. Really, if you can't say it with 20 keys, is it worth having 81 more? Your texts and IMs already look like Prince song titles, so it's not like proper spelling is one of your top priorities. Anyway, if you're not into learning a new typing pattern, consider the FrogPad a highly portable game pad.



Bandai Tamagotchi Connection

Remember Tamagotchi? Of course you do. It wasn't just a doodad, it was an entire lifestyle. But if you could think of one possible flaw in the whole Tamagotchi phenomenon, circa 1998, it was probably that the little low-res critters couldn't meet, settle down, and breed like minks. Bandai has now corrected that oversight. The new Tamagotchi Connection is a \$14.99 edition with a bigger display and better graphics (www.bandai.com). What will really get the schoolgirls a-squealin' is its ability to connect with other TCs via infrared. With enough button pushing, Bandai says that third and even fourth generations of little Tamagotchis are possible from such a union.



Word Clock

Fair warning: If one more person answers, "About that time," when we ask what time it is, there will be bloodshed. Still, we have to admit that when we do get a straight answer, such as "2:57," we do a little conversion in our head to "almost 3:00." The funky Word Clock from NeXtime Clocks (nextime-clocks.nl) does this translation for you. It tells you the time in conversational language, not harsh, soulless numbers. The English model 2562en goes for \$159.50, while a larger edition, the 2563en, sells for \$329.

Belkin Silver Series Interconnects

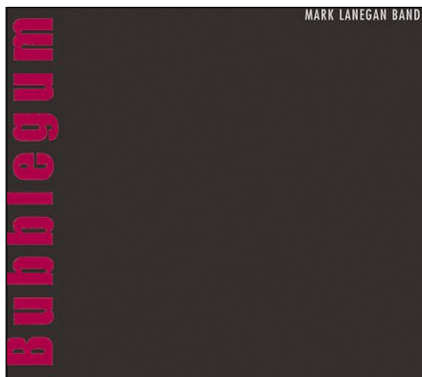
You're reading this magazine, so you probably know that it's pointless to spend all your dough on superior audio and video gadgets if you're just going to connect them with cheap, shoddy cables. All the clarity in the world won't matter if your interconnects are introducing noise. Time to purify with Belkin's Silver Series Interconnects, part of the company's PureAV lineup. For \$29.99 to \$159.99, you can get high-quality digital optical, digital coaxial, S-Video, HDMI (High Definition Multimedia Interface), DVI (Digital Visual Interface), and FireWire cables, among others (www.belkin.com). Remember, garbage in, garbage out.





Music & Movies

The Latest Tracks & Flicks: Are You Not Entertained?



Mark Lanegan Band
"Bubblegum"

Beggars Banquet Records
www.marklanegan.com

Our take: A moody, introspective beauty.

Mark Lanegan Band

Every once in awhile you'll run across Mark Lanegan on the radio waves, his raspy vocals tripping across "I Nearly Lost You There," the hit he and fellow band members in Screaming Trees scored way back when in the Seattle grunge days. Screaming Trees didn't have much success beyond that tune and eventually faded away. Lanegan weathered on, however, and you run across him spewing out vocals on various Queens of The Stone Age records, a band that he's recorded and toured sporadically with for years. But apart from those efforts, Lanegan has also managed to carve out an impressive solo career, teaming often with one-time Dinosaur Jr. member Mike Johnson on songwriting chores. "Bubblegum" is Lanegan's latest effort, and even though Johnson shows up to play, Lanegan goes it alone where the songwriting is concerned, and he's done a fantastic job.

If you take a look at the credits for "Bubblegum," it's easy to write Lanegan off for merely calling in some favors and putting together a who's who list of all-stars to help him flesh out the record's tunes. Throughout the songs you'll find vocal and musical contributions from PJ Harvey, Josh Homme and Nick Oliveri of Queens of The Stone Age, Izzy Stradlin and Duff McKagan of Guns N' Roses, and Greg Dulli of 1990s alternative favorite Afghan Whigs and now The Twilight Singers. But you know what they say happens when you start assuming things.

"Bubblegum" is entirely Lanegan's record, and any contributions he gets from other players only prove to enhance the record's dark, brooding ambience; they never distract from the core of the songs. These are tunes that are so personal and so well-constructed, you can almost picture Lanegan laboring away into the late of night, sitting at a dimly-lit kitchen table, guitar and notebook in hand, scribbling and rescribbling lyrics down while a cigarette smolders in a nearby ashtray. "Bubblegum" practically drips of despair, remorse, regret, and loneliness. Even the record's seemingly bubbly title turns downcast in this line from the sobering yet excellent track, "Bombed": "When I'm bombed, I stretch like bubblegum."

For simple comparison's sake, you could think of Lanegan as a younger Tom Waits, complete with the quirkiness and cigarette-scarred vocals, as you hear on "When Your Number Isn't Up." You could think of Lanegan as Iggy Pop's baby brother, as on "Driving Death Valley Blues": "Well I can't stand the thought of many more miles, but I don't want to go cold turkey." You could think of him as a Keith Richards pupil, as on "One Hundred Days," a devastatingly great tune. Or you could just think of Lanegan as the guy who rocks the hell out of "Sideways In Reverse" and "Head." Whatever correlations you end up drawing to Lanegan, he's a talented songwriter, as "Bubblegum" more than proves. ■

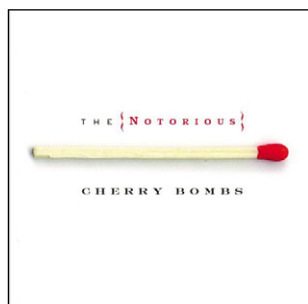


The Notorious Cherry Bombs

The list of artists in Nashville who wouldn't switch careers with either Rodney Crowell or Vince Gill in a country minute is undoubtedly extremely short. Crowell has long been regarded as one of country music's best and respected songwriters. Beyond that, he was once Johnny Cash's son-in-law and a member of Emmy Lou Harris' backing band. Gill is an incredibly talented guitarist who has churned out so many hits it's easy to lose count. Beyond that, he's married to Amy Grant and was once a member of Pure Prairie League, Harris' backing band, and, coincidentally, Crowell's backing band, The Cherry Bombs.

In the late 1970s and early 1980s, few bands were better regarded than The Cherry Bombs, which, in addition to Gill, included the likes of Tony Brown, producer and now co-owner of Universal South Records; Richard Bennett; Glen Hardin; guitar whiz Albert Lee; and Hank De Vito, a steel guitar master. After years of touring, the band members went their separate ways, scoring success on their own.

Years later, in 2002, Crowell got the group back together for a one-off show, which went so well that everyone agreed recording an entire album's worth of new material was indeed possible. The result is "The Notorious Cherry Bombs," a decidedly great



The Notorious Cherry Bombs
"The Notorious Cherry Bombs"
Universal South Records
www.thenotoriouscherrybombs.com

Our take: Super country from a country supergroup.

Cash-like "Oklahoma Dust," and Crowell churns out the beautiful ballad "Making Memories Of Us."

What really drives the record, however, is the incredible camaraderie and musicianship the band displays. De Vito's work is remarkable on "Sweet Little Lisa." Elsewhere, Brown's piano runs are pure honky-tonk magic, and Gill's various takes on banjo, electric guitar, and mandolin are superb as usual. The entire band simply tears it up on the closing "Let It Roll, Let It Ride (Reprise)."

You'll find few country-tinged records this year that are as fun and well-played as "The Notorious Cherry Bombs," which essentially amounts to country's answer to The Traveling Wilburys. ■

record that harkens back to the looseness and creativity of 1970's country. If you're old enough to remember when Conway Twitty, George Jones, Merle Haggard, and others roamed country's landscape, you'll love this record.

Crowell and Gill combined to write three songs, including the hilarious "It's Hard To Kiss The Lips At Night That Chew Your Ass Out All Day Long" and wonderful "Dangerous Curves." Elsewhere, Gill pours out some uncharacteristically husky vocals on the Johnny

k.d. lang

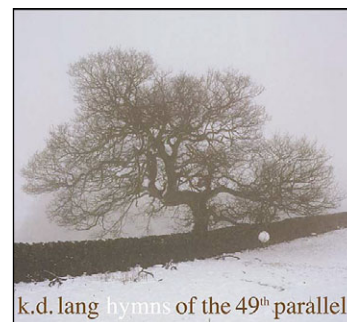
There is little middle ground where k.d. lang is concerned. People generally seem to either like her or not like her. You can trace much of this seesaw of opinion directly back to lang, who has managed to alienate some of her fans with her radical switches among various musical genres, including moving from performing straight-up country to going to cow-punk to ultimately morphing into a nightclub-like chanteuse, performing duets with the likes of Tony Bennett.

Along the way, lang has also been open about her sexual orientation and hasn't shied away from taking part in some controversial events, such as PETA's "Meat Stinks" campaign in the 1990s. That latter stance didn't exactly endure lang with the natives in Canada, where the beef industry is huge. And the move didn't exactly do wonders for her career, as her support of this campaign eventually lost her scores of fans that she's never managed to win back.

On recent works, lang has kept her personal life to herself and expressed herself in song with her considerable voice. On "Hymns of the 49th Parallel," she heads back north, at least in spirit, by covering songs from some of the country's finest songwriters, including Neil Young, Joni Mitchell, Leonard Cohen, and Bruce Cockburn. The result is an album that's often mesmerizing on some songs and always, at least, satisfying on others. As a whole, "Hymns" is a wondrous, slow-paced journey home.

On Cohen's "Hallelujah," lang's powerful voice rises and falls with each of Cohen's lyrical turns. She manages to wrap herself around the song's intricate nuances, making the tune her own, which is quite a feat, considering Cohen's mastery and considering just how many times "Hallelujah" has been covered by others. She doesn't capture the same magic with Young's "Helpless" or "After the Gold Rush," but on Mitchell's "Jericho" and Ron Sexsmith's beautiful "Fallen," lang is magnificent. Her best, however, is on Jane Siberry's "Love is Everything," which lang nails with purity and conviction.

The is lang's first effort for the great Nonesuch Records, and it's a fine, understated debut dominated by piano, strings, and acoustic guitar. An album of covers is always a risky move, but lang's voice is a hypnotic weapon, and she knows how to use it. On "Hymns," she leaves you wounded, which is a good thing. ■



k.d. lang

"Hymns of the 49th Parallel"

Nonesuch Records

www.nonesuch.com

Our take: The Canadian stylist goes home in song.



Hellboy (Two-Disc Special Edition)

Shorn Horns Are A Good Sign

Hellboy (Ron Perlman) is a demon that came through a portal the Nazis briefly created while searching for ultimate power in 1944 (yes, plot points reminiscent of "Raiders of the Lost Ark"). But it's the good guys who end up caring for and nurturing this baby demon to adulthood. Today he's bright red, loves beer, and fights evil. He even shaves his horns and has a crush on the spooky yet pretty Liz (Selma Blair). How's that for an unlikely superhero?

The plot is conventional, and this could very easily have become an average film. What makes it special is director Guillermo del Toro's character exploration. The characters are fleshed out very well for a comic-based movie, and the excellent action sequences will hold your attention. Besides, longtime fans will appreciate how similar the movie characters look to the drawn pages. The transition from paper to the screen is executed seamlessly, and the movie stays true to its origins.

You will detect some video-compression artifacting, but the video quality otherwise looks good with strong, bold colors and detail. It is close to reference quality but not quite there. The DVD's audio is excellent. It uses the rear speakers liberally, and the low-end audio will give your sub a good workout. All the front-channel audio (speech, etc.) is clear and easy to understand.

This is a two-disc release that is loaded with extra features. The DVD includes two audio commentaries on the first disc along with the movie. You'll also find eight comics in addition to two other branching featurettes, "Hellboy's" short film recommendations and some tasty DVD-ROM features. The second disc has enough extras to keep any fan of the film occupied for *hours*. You'll find video galleries, posters, trailers, documentaries, three deleted scenes, and much more. "Hellboy" is a great buy and an enjoyable movie. There's one snag, however: A three-disc "Director's Cut" version is due on Oct. 19. We suggest you wait. ■



Disc Specs: 122 minutes; 1.85:1 Anamorphic Widescreen; English and French Dolby Digital 5.1 with corresponding subtitles; dual audio commentaries (featuring director/writer for one and cast for the other); three deleted scenes (with commentary); 150-minute making-of documentary; character bios from the directory; Storyboard track; Set Visits; multiangle storyboard comparisons; Poster Explorations; printable original screenplay (DVD-ROM); and much more.
Studio: Columbia TriStar
MSRP: \$28.96



Disc Specs: 98 minutes; 1.85:1 Anamorphic Widescreen; English and French Dolby Digital 5.1 with English and French subtitles; 18 deleted and extended scenes; dual audio commentaries by filmmakers; two music videos (Rick Springfield and Pat Benetar); Bloopers Reel; "I Was A Teenage Geek" featurette; making-of documentary; and two set-top features
Studio: Columbia TriStar
MSRP: \$28.95

13 Going On 30 (Special Edition)

Being Big Can Be Fun

In 1988, we saw a 12-year-old boy going on 30 overnight. That film was "Big" and starred Tom Hanks. The film showed us what we lose in our transition from childhood to adulthood and was simultaneously touching and funny. Tom Hanks was even nominated for an Oscar. Last year we had the Lindsay Lohan/Jamie Lee Curtis film "Freaky Friday," which touches on themes quite similar to this year's Jennifer Garner-helmed "13 Going on 30."

Garner (of "Alias" and "Daredevil") does an excellent job of playing 13-year-old Jenna Rink trapped in an adult body. Those tough teen years push Jenna's desire to be popular, and some Wishing Dust on a dream playhouse built for her by childhood friend Matt Flammhaff transports her into the future. Jenna wakes up at age 30 to learn that though successful, she is an unpleasant person who doesn't like what she has become. The rest that follows is an estrogen-fueled take on Tom Hanks' role in the 1988 classic. "13 Going on 30" is enjoyable but probably forgettable for fans of "Big." However, the "be yourself" message will hit home for the teenage female demographic (the film is rated PG-13).

The DVD's video quality is nothing noteworthy. Its foreground detail is excellent, but there are occasional instances of edge enhancement and compression artifacting. It's not horrible, and the core audience for this film probably won't even notice. The 5.1 audio is clear but doesn't really use the surrounds, which could have improved certain scenes. There are 18 deleted scenes but without audio commentary explaining why they were cut. Director Gary Winick's audio commentary is a worthy listen; the second audio commentary, with the producers, is more general but ultimately enjoyable for anyone that loves this film. The majority of extras are fluffy, but we got a good laugh from "I Was A Teenage Geek," which shows the cast in a rather unflattering teenage light. Overall, this DVD will make a good rental unless your teenage daughter wants it for repeat viewings. ■



Game On

The (Mostly) Sports Edition

ESPN NFL 2K5 (PS2, Xbox)

Sega's NFL 2K series of football games has been the only real competition to EA Sports' Madden NFL franchise for several years running, and although NFL 2K games have always been very good, in our estimation they've lagged slightly behind Madden in terms of the overall gameplay experience for the last four years. But because Sega and ESPN aren't content to play second fiddle forever, and due in part to increased online competition with Madden 2005 getting Xbox Live support, NFL 2K5's creators turned up the heat considerably this year.

The first hint you'll get of Sega's determination to unseat the perennial king of football games is 2K5's new, lower price. The game sells for just \$19.99, and if you love football video games, it's quite possibly the best \$20 game you'll ever buy. But Sega didn't stop there; 2K5's graphics are the best the series has ever seen, and the game boasts an improved physics engine (resulting in better balance between running and passing difficulty), more ESPN-branded content and commentary, and some interesting new gameplay options.

Chief among the game's new features is the VIP system, which lets users create custom profiles, including their favorite teams and playbooks, and tracks their tendencies as they play. Your VIP profile includes stats on how often you call run plays vs. pass plays; how often you run plays to the left, middle, and right; and more. The really cool part is that you can download a friend's VIP profile to a memory card from his PS2 or Xbox or get it online and then play games against the computer in which 2K5 uses the profile to simulate your buddy's style of play. When you set up a game against an opponent with his own VIP profile, the game offers some basic tendency information prior to the game, as well, so you can tailor your play to counter that of your opponent.

Sega also takes advantage of the VIP system to simulate games against several celebrities (David Arquette, Carmen Electra, Jamie Kennedy, etc.) who will "call" you from time to time on the phone in your 2K5 Crib, a virtual pad you furnish using points you earn playing games and using the game's various features. A

phone call from a celeb usually includes a challenge to play against that person's VIP profile and custom all-star team; these games include liberal doses of audio clips of the celebrity in question talking smack when things go well and berating their players when things go sour for them.

We found these celebrity challenge games to be only of passing interest, and we're still not sold on Sega's First-Person play mode, in which you play looking at the field from inside a helmet. But even if you ignore these tidbits completely, 2K5 offers a great football experience that is as deep or as quick and easy as you like it. For example, you can take advantage of the game's Preparation mode, which lets you schedule film sessions and practices for particular units prior to game time to boost players' stats in particular areas, or you can ignore it completely and just play.

Either way, ESPN NFL 2K5 is a fantastic football game at a fantastic price. Looks like the Madden franchise has its work cut out for it this year. ■

BY CHRIS TRUMBLE

ESPN NFL 2K5

\$19.99

Sega

www.espnvideogames.com/nfl2k5

ESRB: Everyone



Terrell Suggs (the freight train wearing No. 55) getting ready to help Brett Favre into early retirement.



NFL 2K5's VIP profile system tracks your gameplay tendencies and serves them up in colorful charts and graphs.



Mario Golf: Advance Tour (GBA)

Mario Golf was one of the best games for the Game Boy Color, and the wait is finally over for a Game Boy Advance follow-up. Mario Golf: Advance Tour retains the flavor, challenge, and perfect controls of the original while dramatically enhancing the graphics and gameplay options.

Players begin by creating a golfer and can then progress through the game's story mode to win tournaments, participate in bonus challenges, and gain experience to improve their characters' golf skills. You can also upgrade your clubs to get better distance and control. The game's story mode is straightforward and becomes more interesting as you unlock new courses and the level of competition increases.

The controls are easy to learn. Players press A to begin their backswing and

then press A again to set the power of the swing and let the computer randomly select the impact zone (which determines draw or fade). You can also press A or B to manually select the impact zone.

Mario Golf: Advance Tour mixes all of the elements that make golf such an interesting challenge (wind, club selection, physics) with many of the elements that make the Mario games so charming and fun. It's a better game than its GameCube counterpart and is the undisputed champ of golf games on the Game Boy Advance. ■

BY TRACY BAKER



Shots in Mario Golf Advance are set up from an overhead perspective, but it switches to this golfer view to make swinging more dramatic.

Mario Golf: Advance Tour

\$29.99

Nintendo

www.nintendo.com

ESRB: Everyone

Mega Man Anniversary Collection (NGC, PS2)

Platformers, games that focus on precise jumping and shooting, dominated arcades and consoles in the '80s and early '90s, but the rise of 3D graphics has practically doomed the genre on modern consoles. The Mega Man series stands as arguably the best line of platformers ever created, and the Mega Man Anniversary Collection thankfully brings together eight of the original Mega Man games along with several bonuses.

Mega Man has always revolved around multiple boss battles. Players fight their way through several themed stages that

culminate in Stage Boss battles, and victory there grants the player that boss' unique weapon. Some stages are more difficult (or impossible) to complete until players have acquired a specific weapon, so there's a lot of strategy involved in choosing an efficient path through the game, especially in the superb Mega Man 2.

That's Mega Man in a nutshell, and clever level designs coupled with extremely precise controls elevate the Mega Man games to a level few other platformers can match. The original game was released in 1987 on the Nintendo Entertainment System, so the graphics for the early titles are extremely simplistic by modern standards, but the visuals are crisp, and a few of the soundtracks have been remixed in the PlayStation 2 version to freshen things up. It's interesting to see how the graphics gradually improved from the release of the original game to the release of Mega Man 8, which appeared in

Mega Man is all about the boss battles.

1997 on the PlayStation and Sega Saturn. It's also interesting to see how the series evolved in terms of gameplay, with each addition tacking on new features while still retaining most of the elements that made the previous installments so enjoyable.

The collection is available for both the PlayStation 2 and the GameCube, and each includes its own set of unlockable bonuses. The PlayStation 2 version has the aforementioned music remixes and an episode of the Mega Man animated series. The GameCube version includes interviews with the games' producers, and both versions come with two bonus arcade games—Mega Man: The Power Battle and Mega Man: The Power Fighters—that previously were not available in the United States. If you can tolerate the old-school graphics, this package is definitely one of the best retro bargains ever released. ■

BY TRACY BAKER

Mega Man Anniversary Collection

\$29.95

Capcom

www.capcom.com

ESRB: Everyone





NCAA Football 2005 (NGC, PS2, Xbox)

Home field advantage is one of the most essential factors in any football game. Crowds cheer wildly when the home team succeeds and then boo like banshees when the other team takes control of the ball. When the quarterback starts screaming and the offensive line starts looking at him funny, you know something is wrong. NCAA Football 2005 is the first sports game of any kind to really include the crowd in the game, so much so that it adds a whole new level of realism and strategy to a video game genre that's become a bit stale.

Of course, EA Sports has added the usual bells and whistles. Tackles look a bit more realistic this year thanks to a refined player modeling system. There are a few tweaks to playbooks, such as the ability to add formations (but not specific plays) to your own custom playbook, plus a few new line formations. Nothing too spectacular, but the series has always been a top-tier sports game that usually predates the

Madden Football release by at least a few weeks each year. Yes, you'll get the rah-rah experience of collegiate football with school anthems, realistic-looking stadiums, and a deep dynasty mode once again.

You won't see some of the other improvements in this version until after you've played 10 or 20 games, though. For example, if you play an entire season with one team, a warning may appear once or twice about disciplinary actions against specific players. As usual, you can just "autosimulate" your way through these managerial functions. Still, the dramatic improvements all focus on the crowd. During any game, as long as you are controlling the home team, you can press one button rapidly to pump up the crowd. In stadiums such as Michigan and Nebraska, the effect is more dramatic: more frequent quarterback sacks. When the home crowd starts rocking, the camera (and your controller) will shake, which emphasizes the home-field-advantage effect.



Having trouble hearing the crowd? Try playing a different football sim.

Whether these improvements will make NCAA 2005 worth the upgrade depends on how much you like the series and the collegiate angle. It's not quite as visually stunning as some sports games, and the core game is almost completely unchanged, but NCAA 2005 does get you "in the game" more than it has in the past. ■

BY JOHN BRANDON

NCAA Football 2005

\$49.95

Electronic Arts

www.easports.com/games/ncaa2005/home.jsp

ESRB: Everyone

Tales Of Symphonia (NGC, PS2, Xbox)

Blood-pounding action, stunning graphics, and ambitious design are probably not the right words to describe Tales Of Symphonia, a Namco role-playing game with a decidedly kid-friendly look. Instead, it's heavy on "specials" (the fairly complex chained button combos), battle strategy, and story. The series has always skipped the heavy-handed morals in games such as Final Fantasy, and, for the most part, it works just fine as a light but enjoyable RPG romp.

Tales Of Symphonia involves the life-giving forces of magic and a young apprentice swordsman named Lloyd Irving who must save the land of Sylvant from impending destruction. The story includes a romantic element with young Colette, a female savior-in-waiting. Symphonia's anime-inspired cutscenes look gorgeous and make you want to keep playing just to see what happens next. The close-quarters adventuring

gets repetitive at times, but the "just for fun" battles are usually quite varied.

The game's graphics are sometimes fuzzy and flat, and the battles are neither bloody nor fast-paced. In fact, you can actually bypass most battles just by waiting for monsters to move out of the way. The game suffers from the typical RPG ailments of frequent dungeon romping and too many branching dialogues. Bosses are tough as nails, so you'll need to level up and keep an eye out for ever-more-powerful weapons. As you progress through the game, you have to learn all the combo melee and tech attacks and wait for the unison attacks where all party members strike an opponent together.

Tales Of Symphonia's soundtrack is new-agey and light as a feather. You won't be hearing the clanking swords, such as

those in Sudeki, emanating around the room. But the battles are fun, the story bounces along nicely, and some of the monster battles are pure genius. ■

BY JOHN BRANDON

Tales of Symphonia

\$49.99

Namco

tales.namco.com

ESRB: Teen



Most battles are fun and fairly complex but never too adult-minded.

Sudeki (Xbox)

Sudeki is an anime-style RPG developed by Climax for a Microsoft first-party release. We don't want to give away the storyline, but the general goal is to protect your land of Haskilia from the invaders and eventually saving the world of Sudeki. The plot is interesting, but the game's poorly implemented storytelling results in underdeveloped characters that do little to draw players into the game on an emotional level (unlike characters in a Final Fantasy game).

You'll control up to four characters, Tal (human swordsman), Ailish (human sorcerer), Buki (a beastly melee martial arts fighter), and Elco (human gunfighter), as you progress through your quests. While story implementation is lacking, the combat is fun and makes playing the game worthwhile. And we'd be remiss to not mention the excellent graphics and

audio. Sudeki is pretty and sounds excellent, but we're flummoxed as to why the developers do not allow the entire party of four to duke it out with bosses. When boss fights come around, only a single character is sent to battle.

Gamers looking for a new RPG may do well to give Sudeki a spin, but those of you looking for Knights Of The Old Republic, Morrowind, or a Final Fantasy clone may be disappointed. Despite coming off as a pretty average RPG title, Sudeki may prove to be an enjoyable game for RPG-hungry Xbox gamers (expect to finish the game in about 15 to 20 hours). Sudeki is not a memorable title and is not helped by the shockingly lame end-game, but it should tide you



Combat is the feature that makes this otherwise average RPG worthy of your time.

over until Fable and Jade Empire arrive this fall. ■

BY SAMIT GUPTA CHOUDHURI

Sudeki

\$49.99

Microsoft

www.xbox.com/en-US/sudeki

ESRB: Mature

Tom Clancy's Rainbow Six 3: Black Arrow (Xbox)

Weapons of mass destruction may not readily show up where we expect them, but they do show up in the Black Sea area complemented by big, bad terrorists in the latest Tom Clancy title for the Xbox. Black

Arrow is a standalone game (it doesn't require players to own last year's Rainbow Six 3), but it feels like a pocketbook-friendly expansion without the negative connotations that usually come to mind when you think of an expansion pack.

You'll find an all new campaign featuring 10 missions to keep you and your pals busy before you head into the wonderful world of Xbox Live.

The multiplayer options are the reason you'd pick up this title. The ability to easily create and play with squads (teams) is a big addition. Each squad can be customized with logos, descriptions, and more. The Lone Rush (single-player) and Total Conquest (multiplayer) modes are another big addition that will get fans hot and bothered. The Lone Rush game focuses on clearing levels within a time limit—meeting objectives on the go increases your time. The game

is simple and fun, a thinking man's "arcade" shooter. Total Conquest has players defending base points (called dishes) and forces a team to rely on each other to hold the winning hand. It's quick and a lot of fun on Xbox Live.

We'll make this very easy for you: If you loved the original Rainbow Six 3, do not pass Go—head out and buy this pseudo-sequel. We know you'll love this follow-up. On the other hand, this release will not change your mind if the predecessor didn't rock your world. For those of you sitting on the fence, we recommend renting the original release of Rainbow Six 3 first to see how well you like it. Some of you may find the new co-op split-screen and additional multiplayer modes worth the price of admission. ■

BY SAMIT GUPTA CHOUDHURI

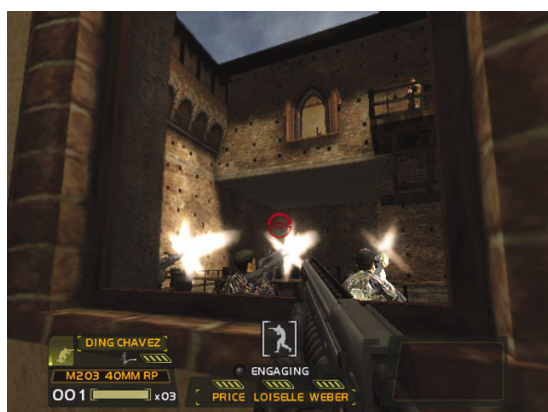
Tom Clancy's Rainbow Six 3: Black Arrow

\$39.99

Ubisoft

www.rainbowsix3.com

ESRB: Mature



Protecting your flank is a vital maneuver in a team game.

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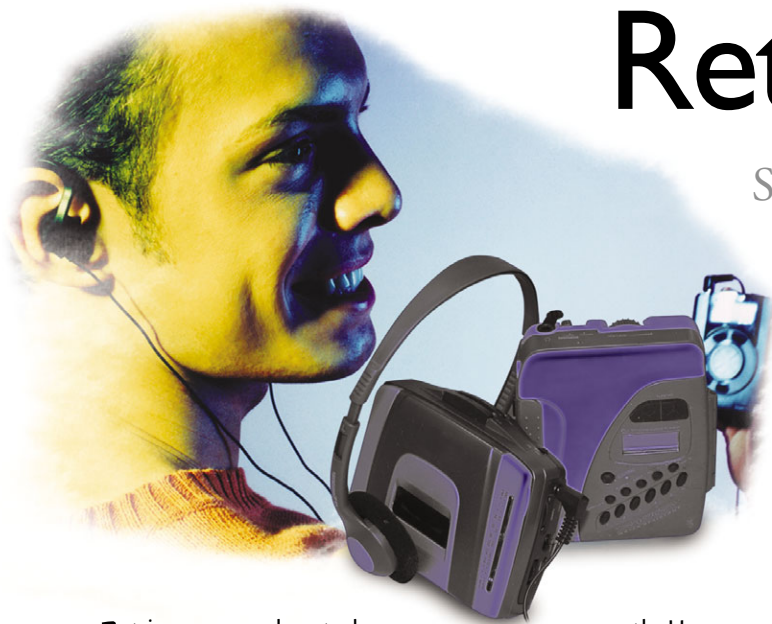
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Retroscope

Stepping To The Music: The History Of Portable Audio Players

It is commonplace today for people to carry their personal music collections wherever they go—even if the collection contains 10,000 songs—thanks to portable digital audio players such as the Apple iPod. Paired with online music merchants such as Napster, these devices have stirred both technological and sociological revolutions since their debut in the late 1990s.

Yet groundbreaking as it has been, the portable digital audio player also is a product of evolution—the latest example in a product category that was born a quarter of a century ago with the Sony Walkman.

Soundabout Spark

The Walkman, the product that forever changed how people interact with music and set the course that led to the portable digital audio player, was initially introduced in Japan as the “Soundabout” model TPS-L, in 1979.

However, the name was quickly changed to the Walkman, and in July 1979 it was brought to the United States as the model TPS-L2, which cost \$200, weighed 14 ounces, and was not much larger than the audiocassette it played.

But while its significance is clear in hindsight, at the time the Walkman was greeted with skepticism by retailers, and Sony anticipated selling only 5,000 per

month. However, after some aggressive marketing by Sony, consumers swarmed to the device, and two months later 50,000 Walkman personal cassette players were sold in Japan alone. To date, according to Sony, 340 million Walkman-branded portable audio players have been sold worldwide.

The figure includes later products that wore the Walkman name, including portable CD, MiniDisc, and digital audio players, but it does not account for the many similar portable audio players from other brands, and from makers of nonbranded consumer electronics products, that the Walkman inspired.

By 1983, Sony notes in a history of the Walkman, the concept of taking personal music everywhere was so popular in the United States that sales of pre-recorded audiocassettes here overtook sales of LP vinyl records for the first time.

“The Walkman became a cultural phenomenon,” says John Barrett, director of research at Parks Associates, a consumer technology research company.

In 1987, the first Walkman was installed at the Smithsonian Institution.

The Rise Of The Compact Disc

While the Walkman portable audiocassette player was enjoying great success, Sony was working with Philips and Polygram on the successor to the cassette, the

compact disc, which the three companies jointly introduced in 1981.

The early buyers of CD players and discs were audio enthusiasts only, however, and after an initial rush by these people, the market cooled down. So, to inject more vitality in the market, in November 1984 Sony introduced the first portable CD player, the D-50.

The size of a CD case, the D-50 was made possible by work done at Sony to reduce the cost of making CD players by reducing the size of the device’s internal parts. It cost \$299, and evolved into a product line named Discman.

Competitors followed with portable CD players of their own, and the market for prerecorded CDs blossomed.

Mini Media

From the mid-1980s forward, variations on the audiotape and CD technologies followed. The first Walkman to use DAT (digital audiotape) was introduced in 1990.

Then, in December 1992, Sony introduced Americans to yet another format for recording audio: the MiniDisc. It was an ultra-compact optical disc that was mated to a whole new generation of portable audio players.

In the years since its introduction, the MiniDisc has been a lot more popular in Asia than in the United States, says Barrett, who attributes the disparity in part to the prices of MiniDisc players, which stayed relatively high for many years, and to the greater penchant of Japanese to be early adopters of technology.

Barrett also notes that portable CD players never achieved the popularity of portable audiocassette players, because the diameter of the CD keeps them at a size that is awkward to carry around.



DIY Digital To Go

The rise of the current crop of portable digital audio devices can be traced to 1998, when Diamond Multimedia, a maker of PC graphics and audio add-in boards, introduced the Rio PMP300, which cost \$299 and came with 32MB of flash memory, which users could fill with songs they had saved in the MP3 file format, after taking the songs off a CD in a process called **ripping**. That amount of memory was capable of holding only a handful of songs, however.

Sales of the PMP300 jumped after the RIAA (Recording Industry Association of America), a group formed by music publishers, sued Diamond to stop the sale of the Rio. Diamond was victorious, and the attention sparked the Rio's sales, recalls Hector Martinez, a spokesman for Digital Networks North America, which owns the Rio brand now.

The major advances in portable digital audio player technology have mainly been in the area of data storage capacity. In addition to offering more internal flash memory, currently up to 1GB, subsequent players have accommodated larger-capacity removable flash memory cards. And beginning in 2000 with the Rio Riot and Nomad Jukebox, portable

digital audio players were introduced with internal hard drives that offered gigabytes of storage capacity, enough to hold upwards of 1,000 songs.

In 2001, Apple introduced the iPod, which cost \$399 and featured a 5GB hard drive capable of holding 1,000 CD-quality songs. In July 2004, Apple introduced two new iPods. The first, with a 20GB hard drive capable of holding 5,000 songs, costs \$299. The second, with a 40GB hard drive with room for 10,000 songs, costs \$399. In addition, the iPod Mini, a smaller version of the original, now sells for \$249.


Meanwhile, innovations based on portable digital audio player technology have spilled over into other product arenas. Beginning in 2000 with the Rio Volt (\$170 at the time), portable CD players were imbued with the ability to play digital audio files that were stored on recordable CDs. The Volt was discontinued later, but brands such as Sony, Philips, and Panasonic also added the feature to portable CD players in 2000. They continue to offer the feature today in portable CD players that sell for less than \$50.

Hitting the Road

Today, with sales of portable digital audio players skyrocketing, the devices

and their technologies are showing up in ever more places. BMW recently began selling what may be the ultimate iPod accessory: an adapter that plugs into the digital audio player and pumps its stored audio through the car's stereo system.

What's next for portable digital audio players? According to Todd Altman, market development manager at Intel's communications group, which makes chips that run these devices, innovations on the drawing board for the second half of this year include color screens, bigger hard drives (up to perhaps 80GB), and the addition of a wireless networking technology, such as Bluetooth, for use with wireless headsets.

Finally, in yet another technological shift, digital audio is migrating into another new portable player that goes far beyond what came before: the portable media center, or PMC. This new device, from the brands Samsung, iRiver, and Creative, holds digital video files, as well as digital music and photos. Start building your digital video collection now. 

BY ROBERT E. CALEM



You say you want a revolution? The original Sony Walkman changed how we moved to our music.

Time line

- 1979 – Sony introduces the Walkman, the portability of which has a profound impact on how users listen to music.
- 1983 – Prerecorded audiocassette sales surpass that of vinyl LPs for the first time.
- 1984 – Sony introduces the D-50 portable CD player.
- 1992 – Sony releases the MiniDisc, though the players and media struggle to gain a foothold in the United States.
- 1998 – Diamond Multimedia debuts the first portable digital audio player, the Rio PMP300.
- 2000 – Creative Lab's Nomad Jukebox and Diamond's Rio Riot are the first digital audio players to use hard drives.
- 2001 – Apple's iPod, with a 5GB hard drive, hits the market and becomes a cultural phenomenon.
- 2004 – Apple's slimmer iPod mini appears in February, followed in July by the third-generation iPod.



CE Pick Of The Month

Portable Video Done Right

Regardless of what Steve Jobs says about tiny portable devices not delivering a quality video experience, consumers have been looking for the right blend of portability and features for watching TV and movies on the go for years.

Yeah, you can watch DVD movies on a notebook PC, and today's big, crisp LCD panels are very easy on the eyes. But unless you really need the power and utility of a PC, is watching a DVD movie really worth lugging that big thing through airports and in the cramped confines of planes and cabs? Portable DVD players, on the other hand, are a little smaller and lighter than the average notebook, making them easier to take with you pretty much anywhere. But because they don't have hard drives and can use only removable DVD media, your viewing options are limited to commercial DVD movies or other types of video that you've burned to DVD.

What if you could get a device that's easier to tote than a notebook and much more powerful and flexible than a portable DVD player? That's where portable video players come in. These hard drive-based media players don't have the killer 15-inch screens you see on some notebooks, but they are almost as compact as today's digital music players and still have screens large enough to get the job done. (See page 66 for a look at several current and upcoming examples.)

Our favorite portable video player so far (based on tech specs and feature lists) is Archos' AV400 Pocket Video Recorder. The AV400 series consists of

an as-yet unannounced number of models ranging in hard drive capacities from 20GB to 100GB and having screens from 3.5 inches to 3.8 inches in size, but everything else about the player is the same no matter which model you buy. In other words, every member of the AV400 series has USB 2.0 and USB 1.1 connectivity and a CompactFlash Type I memory card slot. Each one can record and play MPEG-4 video at 30 frames per second at 704 x 480; supports the MP3, WAV, and WMA (Windows Media Audio)

audio file formats; and can store and display JPEG (Joint Photographic Experts Group) photos. You can also use the AV400 to move big chunks of data around. The best part, though, is that the AV400 is also a tiny DVR (digital video recorder). That's right—just slap the player into the included TV cradle (connected to your video source by a composite or S-Video cable), and you can program it to record your favorite shows so you can watch them later.

Not bad for a unit that measures just 3.1 inches high x 4.9 inches wide x 1 inch deep and weighs either less than 10 ounces (the 20GB version) or just over 11 ounces (the higher-capacity versions). The AV420 has an MSRP of \$549.95, and the 80GB AV480 is listed at \$799.95. At these prices, an AV400 is hardly an impulse purchase, but considering all the stuff this thing can do, we think it's well worth the money. **CE**



The Archos AV420, shown here with its included TV Cradle.

Think of them as a Mute button for the world around you.

Whether it's the engine roar on airplanes, noise of the city, bustle in the office or the blare of neighborhood yard work, these headphones let you hush them all. And they do it with the flick of a switch. You savor delicate musical nuances in places where you couldn't before. And when you're not listening to music, you can use them to quietly enjoy a little peace. Clearly, Bose QuietComfort® 2 headphones are no ordinary headphones. It's no exaggeration to say they're one of those things you have to experience to believe.

Reduce noise with Bose technology.

David Carnoy reports on CNET that our original noise-reducing headphones "set the gold standard." And according to respected columnist Rich Warren, our newest headphones "improve on perfection." They electronically identify and reduce noise while faithfully preserving the music, movie dialogue or tranquility that you desire. As Jonathan Takiff reports in the *Philadelphia Daily News*, "Even in the noisiest environment, wearing these phones creates a calming, quiet zone for easy listening or just snoozing."

Enjoy your music with our best headphone sound quality ever.

After trying QuietComfort® 2 headphones, audio critic Wayne Thompson reports that "Bose engineers have made major improvements." The sound is so clear, you may find yourself discovering new subtleties in your music. CNET says "All sorts of music – classical, rock, and jazz – sounded refined and natural."



"The QuietComfort 2 lives up to its name, enveloping you in blissful sound in the utmost comfort. It's easy to forget they're on your head." That's what columnist Rich Warren says. And as Ivan Berger reports in *The New York Times*, the "QuietComfort 2

offers more conveniences than the original model." You can wear them without the audio cord to reduce noise. Or, attach the cord and connect them to a portable CD/DVD/MP3 player, home stereo, computer or in-flight entertainment system. When you're done, their convenient fold-flat design allows for easy storage in the slim carrying case.



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